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EDITORIAL NOTICE.

The Archives of Ophthalmology is a bi-monthly journal, published in annual volumes of about six hundred pages each, extensively illustrated with cuts in the text, half-tone text plates, and lithographic plates, many in colors.

About three quarters of the space is devoted to original papers, and the remaining quarter to a systematic report on the progress of ophthalmology, and to reports of societies, book reviews, and miscellaneous notes, all of it original.

The papers and reports are original, and only accepted with the understanding that they are to be published in this journal exclusively. The original papers in the English edition appear in the German (*Archiv für Augenheilkunde*) either in full or in more or less abridged translations, and *vice versa*. Any subscriber who wishes to refer to the original text of a translated or abridged paper may, by applying to the editors, obtain a reprint which he is expected to return after perusal. The subscription price of the ARCHIVES OF OPHTHALMOLOGY is $5.00 per year payable in advance. The price per number is $1.00.

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The illustration in Dr. Snell's article on "A Case of Extensive Accidental Corneal Splitting," on page 621 of Vol. XLIII., should be rotated one hundred and thirty-five degrees (135°) to the right so that the cilium stands in a nearly vertical position, the apex being directly down.

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VOL. XLIV. No. 1

ARCHIVES OF OPHTHALMOLOGY.

REPORT OF ONE HUNDRED SUCCESSIVE EXTRACTIONS OF CATARACT IN THE CAPSULE AFTER SUBLUXATION WITH THE CAPSULE FORCEPS.[1]

By ARNOLD KNAPP, M.D., NEW YORK CITY.

AFTER my visit to Colonel Smith in India, where I had the privilege of extracting cataracts in the capsule under his guidance, I attempted this operation here in New York, but failed to dislocate the lens by external manipulation without subjecting the eye to greater pressure than seemed wise. I therefore abandoned this method and returned to the old capsulotomy operation with the capsule forceps.

Dr. C. B. Meding, of New York, drew my attention to the Kalt capsule forceps, the extremities of which are flattened, cup-shaped, and without teeth. As these forceps are blunt, they have, according to Kalt,[2] the great advantage of not tearing the capsule at the place of application but at the circumference of the lens, so that most of the anterior capsule is removed. In using this forceps I found that in many cases the grip obtained on the capsule was so firm that after some manipulation the cataract became subluxated, whereupon it could be extracted in the capsule with very slight external manipulation and very little trauma to the eye. In the cases where the capsule tore after applying the forceps before subluxation had taken place, a large piece of the anterior capsule was always obtained, and the operation was then no different from the old one.

---

[1] A report on ninety-four of these cases operated on after this method was presented at the meeting of the Am. Ophth. Soc. at Hot Springs, Va., May, 1914.

[2] Soc. d'ophtalmol., Paris, 1909.

Since February 9, 1910, I have performed one hundred extractions of cataract in the capsule, after preliminary subluxation according to this method, and I now wish to report upon these successive cases in full.

Description of Operation: After the usual preparation and the instillation of one drop of atropin, under holocain anæsthesia, the Koster speculum is introduced and left in place until the operation is completed, unless there is danger of or actual prolapse of vitreous. An assistant is necessary only in the presence of complications. The section must be large and should be just short of half the corneal circumference with a conjunctival flap. After the iridectomy, the capsule forceps is introduced to a point below the center of the pupil, the branches are then allowed to broadly separate, and a distinct knuckle of capsule is grasped. The grasp should not be too tight lest the capsule be torn, but sufficiently firm to exert traction on the periphery of the lens capsule. The closed branches of the forceps are gently moved from side to side, up and down, or rotated, and the capsule can be seen to follow in the various directions. When the dislocation has succeeded, a part of the margin of the cataract in the capsule appears free in the pupillary space. The portion dislocated is usually below, generally slightly to one side or the other, with the upper attachment unruptured. The forceps is then released and withdrawn. Pressure is exerted straight back on the lower part of the cornea with Smith's hook, and the cataract can be seen to turn a somersault; it "tumbles," in other words, as Smith calls it, and is delivered feet first. When the entire lens has been delivered, it will be found adherent above, where it is finally separated by a lateral stroking motion. In some cases the head presents first; the delivery is then slower and counterpressure must be applied at the scleral margin. The iris columns are then carefully replaced. The coloboma should ultimately not appear any different from that after an ordinary extraction.

Owing to the size of the lens in its capsule, and the necessary rupture of its suspensory attachment, the columns are apt to become wedged into the iris angle and are extricated with more trouble than usual. The conjunctival flap is replaced and the speculum removed. Atropin ointment is introduced into the conjunctival sac and a dry dressing is applied. Both eyes are bandaged and the dressing is not changed for four days, unless some complication is feared. The unoperated-on eye is then left open and the patient is allowed up. The treatment of vitreous prolapse is the same as in the ordinary operation. If the capsule ruptures during the expression of the lens it can generally be easily grasped and drawn out with the blunt capsule forceps, after the contents have been expelled. There is practically no after-treatment. There may be some deep opacity of the cornea, especially if the lens is very large and the incision small, but this disappears after a few days.

SUCCESSIVE LIST OF CASES

No.	Name	Age	Condition of Lens	Vitreous or Complications	Healing	Final Result
1	Gilligan.......	51	Mature.	..	..	$\frac{20}{15}$
2	Davenport....	82	Hypermature.	..	..	$\frac{10}{200}$ Dystrophia corn. epith.
3	Fredericks....	67	Hypermature.	..	Vomited; hemorrhage in vitreous and retina.	$\frac{20}{40}$ Opac. vitr.
4	Held.........	82	Hypermature.	..	..	$\frac{15}{200}$ Central choroidal changes.
5	Hagenman....	68	Mature.	+ Before extraction; loop used.	..	$\frac{20}{30}$ Opac. vitr.
6	Scheffmeyer...	76	Mature.	+ Before extraction; loop used.	Cyclitis.	$\frac{20}{40}$
7	Ruzeck.......	58	Mature.	..	Iris prolapse.	$\frac{20}{20}$
8	Goldman......	61	Mature.	..	..	$\frac{20}{40}$ Old mac. corneæ.
9	Gibson........	66	Mature.	..	Hyphema.	$\frac{20}{15}$
10	Pia...........	69	Mature.	..	Cyclitis.	$\frac{20}{40}$
11	Oltman.......	68	Mature.	Section down; old iridectomy.	..	$\frac{20}{70}$ Opac. vitr. (old).
12	Keever.......	52	Mature.	Diabetes with acetone.	Iridocyclitis.	Proj. faulty.
13	Goldberg......	34	Hyper.(traum.)	+After section.	..	$\frac{20}{50}$
14	Donovan......	60	Mature.	..	..	$\frac{20}{20}$
15	Held.........	83	Hypermature	..	..	$\frac{10}{200}$ Central choroidal changes.
16	Angier........	61	Mature.	..	..	$\frac{20}{70}$ Central choroiditis, opac. vitr.
17	Everstein.....	82	Hypermature.	..	Hemorrhage in vitreous.	$\frac{20}{70}$ Myopia, choroidal change.
18	Mathews......	61	Mature.	..	..	$\frac{20}{20}$ Opac. vitr.
19	Hamer........	48	..	..	..	$\frac{20}{40}$ Membr. opac. vitr. (old).
20	Walsh........	58	Immature.	..	..	$\frac{20}{30}$
21	Humphries....	64	Mature.	..	..	$\frac{20}{20}$ —
22	Sangmar......	73	Hypermature.	..	..	$\frac{20}{30}$
23	Edelstein.....	64	Hypermature.	..	..	$\frac{20}{50}$ Opac. vitr.

24	Humphries....	64	Mature.	..	..	$\frac{20}{15}$ —
25	Steller........	51	Mature.	..	..	$\frac{20}{15}$ —
26	Farian........	70	Mature.	..	Cyclitis.	$\frac{20}{30}$ Opac. vitr.
27	McGivney....	65	Mature.	..	..	$\frac{20}{20}$ —
28	Wiener.......	67	Mature.	..	..	$\frac{20}{20}$
29	Stableford.....	60	Mature.	+ Followed lens.	Cyclitis.	$\frac{20}{70}$ Updrawn pupil, hyaloid cloudy.
30	Himmelweit...	70	Mature.	Previous glaucoma.	..	$\frac{20}{50}$ Optic atrophy.
31	Schnurle......	64	Mature.	..	..	$\frac{20}{20}$ —
32	Terreforte......	68	Mature.	..	..	$\frac{20}{30}$
33	Walsh........	69	Immature.	..	..	$\frac{20}{20}$
34	Hipp.........	69	Mature.	..	..	$\frac{20}{20}$
35	Goldberg......	44	Hypermature.	..	..	$\frac{20}{20}$
36	Shea.........	60	Mature.	+ Before extraction; spoon used.	Neuroretinitis.	$\frac{20}{30}$ Opac. vitr.
37	Buggie........	75	Mature.	..	..	$\frac{20}{20}$
38	Goldbaum....	63	Mature.	..	..	$\frac{20}{20}$
39	Himovitch....	59	Mature.	+ On closing eye. Ruptured caps, extracted.	Neuroretinitis.	$\frac{20}{70}$ Opac. vitr. opac. corneæ.
40	Blumberg.....	55	Mature.	..	..	$\frac{20}{30}$
41	Gundel.......	66	Mature.	..	..	$\frac{20}{20}$
42	Randall.......	70	Mature.	..	Retrochoroid. hemorrhage.	Enucleation.
43	Harty........	73	Mature.	+ Squeezed; after extraction.	..	$\frac{20}{30}$
44	Hoag.........	80	Mature.	+ Squeezed: after extraction.	..	$\frac{20}{40}$
45	Feltman......	47	Mature.	..	Iris prolapse.	$\frac{20}{40}$
46	Greeley.......	68	Hypermature.	+ At end.	Iritis.	$\frac{20}{40}$
47	Ryan.........	48	Mature.	Projection faulty.	..	M.H. old detachment. Opac. vitr.
48	Panowitz.....	45	Immature.	..	..	$\frac{20}{70}$ Myopic choroidal changes.
49	Hauptman.....	70	Hypermature.	..	..	$\frac{20}{40}$
50	Levi..........	50	Mature.	..	..	$\frac{20}{30}$

No.	Name	Age	Condition of Lens	Vitreous or Complications	Healing	Final Result
51	Hinkovitz.....	65	Hypermature.	. .	. .	20/50
52	Goldstein.....	58	Mature.	. .	. .	20/20 —
53	Brown.........	74	Hypermature.	Corneal opacity.	. .	20/50 Myopic choroidal changes. Opac. vitr.
54	McGivney....	65	Mature.	Corneal opacity.	Iritis.	20/70 Opac. vitr.
55	Matrass......	72	Hypermature.	+ Capsule ruptured and extracted.	. .	20/70
56	Zodikow......	49	Immature.	Capsule ruptured and extracted.	. .	20/30
57	Wehle........	60	Hypermature.	. .	. .	20/50 Opac. vitr. (old), optic. atrophy.
58	Janowitz......	58	Mature.	. .	. .	20/50 Opac. vitr. (old).
59	del Valle......	62	Mature.	. .	. .	20/20
60	Ginsberg......	65	Mature.	+ Spoon delivery.	Neuroretinitis.	20/70 Opac. vitr.
61	del Valle......	62	Hypermature.	+ After extraction.	. .	20/20
62	Shapiro.......	49	Hypermature.	. .	. .	20/20
63	McNeeley.....	71	Hypermature.	. .	. .	20/40 Myopia, opac. vitr.
64	Gnautch......	60	Immature.	. .	Struck eye. Vitreous hemorrhage.	20/70
65	Jacobs........	62	Mature.	. .	. .	20/20
66	Buchman.....	62	Hypermature.	. .	. .	20/30
67	Redinger......	68	Mature.	. .	Detached choroid; hemorrhage.	20/30
68	Fitzpatrick....	74	Mature.	. .	. .	20/20
69	Cook.........	60	Immature.	. .	Detached choroid.	20/30
70	Fulham.......	58	Mature.	. .	. .	20/20 —
71	Sullivan......	65	Mature.	Corneal opacities.	. .	20/70 Maculæ corneæ.
72	Shapiro.......	49	Mature.	Capsule ruptured and extracted.	. .	20/20
73	Barry........	60	Mature.	. .	. .	20/20
74	Keeley........	68	Hypermature.	. .	Faint hyaloid opacity.	20/30 Choroidal changes.
75	Michelfelder...	72	Immature.	. .	. .	20/20

76	Binger........	70	Immature.	Old glaucoma. Cystoid scar.	..	$\frac{20}{200}$ Deep corn. opac.
77	Harrison......	51	Immature.	..	..	$\frac{20}{30}$ Opac. vitr.
78	Hirschfeld.....	64	Mature.	..	Prolapse iris.	$\frac{20}{20}$ —
79	Mayer........	60	Mature.	..	..	$\frac{20}{20}$
80	Rosenfeld.....	57	Mature.	..	..	$\frac{20}{30}$
81	Maggio.......	60	Immature.	+ Followed extraction.	..	$\frac{5}{5000}$ Myopic choroiditis; maculæ corneæ.
82	Shannon......	71	Immature.	Previous glaucoma.	Cyclitis.	$\frac{20}{70}$ Updrawn pupil.
83	Barron.......	71	Immature.	..	..	$\frac{20}{30}$
84	Crosby.......	62	Immature.	+ At end of operation.	..	$\frac{20}{30}$
85	Bergin........	49	Hypermature.	..	Iris prolapse.	$\frac{20}{30}$
86	Kasnovitz.....	54	Mature.	+ With lens.	..	$\frac{20}{30}$ Opac. vitr.
87	Beyer........	67	Hypermature.	Capsule ruptured and extracted.	..	$\frac{20}{200}$ Retinitis (diabetic).
88	Gleason.......	73	Hypermature.	..	..	$\frac{20}{15}$
89	Marshall......	49	Immature.	..	..	$\frac{20}{30}$
90	Strohofer.....	78	Mature.	..	Partial iris prolapse.	$\frac{20}{40}$
91	Bause........	74	Mature.	..	..	$\frac{20}{70}$ Central chorioretinitis (old).
92	Libenow......	64	Mature.	..	..	$\frac{20}{30}$ Opac. vitr.
93	McKean......	51	Mature.	..	..	$\frac{20}{30}$
94	Poppe........	62	Mature.	..	Iris prolapse.	$\frac{20}{30}$
95	Rothnagel.....	75	Hypermature.	..	Vitreous hemorrhage.	$\frac{20}{100}$ Opac. vitr.
96	Gibson.......	60	Hypermature.	+ Spoon delivery.	..	$\frac{20}{30}$
97	Thompson....	69	Hypermature.	Capsule ruptured and extracted.	..	$\frac{20}{20}$ —
98	Sommers......	60	Immature.	..	..	$\frac{20}{20}$
99	Woodhouse....	62	Mature.	..	Iritis.	$\frac{20}{30}$
100	McBurney....	73	Mature.	..	..	$\frac{20}{30}$ Opac. vitr.

+ indicates prolapse of vitreous.

SUMMARY: Mature 59; hypermature 26; immature 15.

Visual results: $\frac{20}{15}$, 5; $\frac{20}{20}$, 18; $\frac{20}{20}$−, 9; $\frac{20}{30}$, 27; $\frac{20}{40}$, 11; $\frac{20}{50}$, 7; $\frac{20}{70}$, 13; $\frac{20}{100}$, 1; $\frac{20}{200}$, 2; fingers, 4; projection faulty, 2; total loss, 1.

Prolapse of vitreous: 16. The slightest loss of vitreous is counted: usually very small in amount; decided loss in 1 only.

Visual results of this group of vitreous prolapse: $\frac{20}{20}$, 1; $\frac{20}{30}$, 7; $\frac{20}{40}$, 2; $\frac{20}{50}$, 1 (Traumatic cataract); $\frac{20}{70}$, 4 (2 Mac. corneæ); $\frac{5}{200}$, 1 (Myopia, Mac. corneæ).

Capsule ruptured during extraction, separately extracted, 6.

Iridocyclitis: 9; Iritis, 6; Cyclitis, 3.

Prolapse of iris: 6 (including incarceration).

Detachment choroid (transient), 2.

Hemorrhage in retina and vitreous: 4 (1 of these traumatic).

Retrochoroidal hemorrhage: 1.

Uncomplicated: 76.

Complicated: 24.

Dystrophia corn. epithel	1
Mac. corneæ	3
Central chorioretinal changes	6
Optic atrophy	1
Glaucoma (previous)	3
Detachment retina	1
Hemorrhage	1
Myopia (choroidal changes)	4
Opac. vitr. (old)	4

Of the 76, 68 obtained vision $\frac{20}{15}$ to $\frac{20}{40}$, 97 per cent.

2	"	"	$\frac{20}{50}$
4	"	"	$\frac{20}{70}$
1	"	"	$\frac{20}{100}$

Projection faulty, 1 (iridocyclitis, in diabetic subject with 8 per cent. sugar, aceton, and diacetic acid).

The advantages of an extraction in the capsule are, I think, generally accepted. The beautiful black pupil, the unusual freedom from ciliary congestion, from iritis, and all the troubles which retained cortex and capsular thickenings may cause, not to speak of the secondary operation, often more difficult than the primary extraction, must be convincing arguments in favor of the extraction in the capsule operation if the dislocation of the lens could only be simplified and the eye not subjected to too great risk. This is partly accomplished by the method of subluxation with the capsule forceps. The dislocation with the capsule forceps, however, only succeeds in a certain percentage of cases, which, roughly speaking, is from 40 to 50 per cent. The procedure generally fails in cataracts where the capsule is very thin and the subcapsular opacity is an uneven bluish white. The operation should not be undertaken in unreasonable patients. It succeeds proportionately with the age of the cataract; the dislocation takes place easily in the hypermature and sclerosed lenses, many of the latter being quite immature, and considerable sight remaining. In the "disciform" variety extraction in the capsule with forceps dislocation is much easier than by the Smith method.

Nearly a year after I began with this operation, Stanculeanu reported at the meeting of the German Ophthalmological Society upon a method of extraction of cataract in the capsule, which seems to be practically the same as the one described in this paper. In a later article[1] he says that in the Bucharest Clinic, Manolescu had for sixteen years practised removal of the anterior capsule of the lens in the cataract operation by means of the convex curve of the ordinary iris forceps without teeth. Stanculeanu abandoned the Smith operation after a trial of twenty cases, and developed a method of extraction in the capsule after dislocation with this Manolescu forceps which he had modified by the addition of a narrow groove along each branch of the forceps. He succeeded in dislocating the lens in the capsule with this forceps in 50 to 70 per cent. and is very well satisfied with his results. I have not used the Manolescu forceps, so I cannot compare it with the Kalt. The late Dr. Greene, of Dayton, Ohio, had used both forceps and preferred the Manolescu model, which he had had changed slightly by making the ends bulbous.

It seems to me that this is a legitimate and conservative development of our operative treatment of cataract which insures for many of our cataract patients the advantages of removing the cataract in the capsule without subjecting them to greater risk than the ordinary operation. If the subluxation does not succeed, a much larger piece of the anterior capsule is removed than with the toothed capsule forceps; the operation, otherwise, does not differ from the usual one. Improvement in technic and in instruments should increase the percentage of cataracts which are capable of dislocation by this method.

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[1] *Klin. Monatsbl. f. Augenheilk.*, p. 527, 1912.

PURULENT MENINGITIS FOLLOWING PENETRATION OF AN EYEBALL BY A FISHHOOK.[1]

By CLARENCE A. VEASEY, M.D., Spokane, Washington.

THE following case herewith presented seems to the writer to possess a sufficient number of unusual and interesting points to merit its isolated report.

The patient, a strong but highly nervous, well preserved man, aged 66 years, accustomed all his life to living out-of-doors, had the misfortune to have a flyhook penetrate near the center of the left cornea, on a back cast of his line, at 11 A.M., August 3, 1912. The barb passed to the interior of the eye, the point of the hook penetrating the lens. The patient was obliged to walk two miles along the mountain stream where he was fishing, and then row a boat about four miles across the lake into which the stream emptied, and drive his own automobile twenty miles, most of the distance being along a bad lumber road through the woods, before medical assistance could be obtained. The hook penetrated the eyeball about 11 A.M. and it was after six the same evening, or seven hours later, before the hook was removed by the family physician, Dr. J. H. King of Cranbrook, B. C. The dangers of infection and sympathetic inflammation were explained to the patient, and he was advised by his physician to have the eyeball removed at once, but declined.

He was brought to Spokane by his son-in-law, Dr. F. W. Green of Cranbrook, the following day, this being the earliest that he could reach the city, arriving about 8 P.M., August 4th, at which time the writer made his first examination. There was found a small ragged wound near the center of the cornea, about 4*mm* in length, the anterior chamber was abolished, the pupil contracted, and all of the iris appeared to be covered with a very thin layer of pus. A moderate amount of œdema of the conjunctiva was beginning below. The patient again declined immediate enucleation, and an effort was made to save the eye.

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[1] Read at the annual meeting of the Pacific Coast Oto-Ophthalmological Society, July, 1914.

He was taken at once to the hospital and placed under the care of competent nurses, constant cold compresses through thin antispetic dressings being employed. Saline irrigations, atropin, and argyrol were used every third hour, the eye being immediately dressed again.

On the following morning, August 5th, twelve hours after the patient was first seen, the conjunctival œdema was somewhat more marked. There was some pus in the anterior chamber and the latter had not yet reformed. The wound was opened, the pus evacuated, and two drops of a 25 per cent. solution of argyrol were injected into the anterior chamber. Cold compresses, saline irrigations, atropin, and argyrol were continued as before. The same evening, August 5th, or less than twenty-five hours from the time the patient first came under observation, or fifty-seven hours from the time the fishhook penetrated the eyeball, the œdema was so extensive that the cornea was completely surrounded, and it was with difficulty that the eyelids were closed. Some pus was again showing in the anterior chamber, and consent being now obtained the eyeball was immediately enucleated, about 8 P.M. Upon opening the eyeball, immediately after enucleation, a thin grayish line was found extending from just behind the lens through the vitreous almost to the optic nerve.

The following morning the patient was doing exceedingly well, having spent a very comfortable night. There was no temperature, which had only been running as high as 99.5° for a day or so previous, and the patient expressed himself as feeling particularly well, barring the extreme reaction from his tremendous nerve strain.

At 5 P.M., August 6th, eighty hours from the time of the penetration of the eyeball by the fishhook, there occurred a severe headache, which became almost unbearable some hours later. Together with this there were marked nervousness, restlessness, irritability, and tossing around in bed. The temperature was 104.6°, per rectum. There was no nausea or vomiting, and no chills had occurred. The headache was controlled by hypodermics of morphia and ice-bags applied to the head.

The following morning, August 7th, at six o'clock, there occurred slight nausea and vomiting. The headache had entirely disappeared, but the patient was quite deaf, the deafness being so marked in the right ear that it was impossible for him to hear even shouting. No deafness had ever been observed before. The patient was still restless, but there were no muscular twitchings, no impairment of any muscles, no rigidity of the neck, and no Kernig sign. A consultation was now held with Dr. Wilbur Mackenzie and Dr. James Neff. The temperature was 99.5° by mouth, the patient much more comfortable, but quite nervous, irritable, restless, and desired to be let alone. The pupil was contracted, the contraction being accounted for by the hypodermics of morphia, and no optic neuritis was present. Bromide of sodium and chloral were given every three hours to quiet the patient, and on the morning of August 8th another consultation was held with Drs. Mackenzie, Neff, and Green. A blood count made by Dr. M. M. Patton showed 23,000 leucocytes. The stump of the enucleated eye was quite clean and of a healthy appearance, but an attempted culture was made of some of the mucus present, there being no more than is found in every case of enucleation. Not the slightest œdema in the socket was observed at any time.

At 2:30 P.M., August 8th, with Drs. Mackenzie, Neff, and Green a lumbar puncture was made. The fluid came off with great force and at first was clear, soon becoming milky, the last amount being quite thick and looking almost like pure pus. Stained smears showed a pure culture of an encapsulated pneumococcus, which Dr. Patton subsequently found upon cultivation to be the pneumococcus of Fraenkel. Immediately 40*cc* of antipneumococcus serum were injected and the preparation of vaccine from the germ found immediately begun. The blood pressure was 155. About 10 P.M., August 8th, the patient became unconscious, having been delirious the previous day, and about 2:30 A.M., August 9th, began to sink gradually. At 3 P.M., August 9th, the vaccines were ready and employed, although the case was at this time practically hopeless. The patient remained in an unconscious state after 2:30 A.M., August 9th, and died at ten o'clock the same evening. At no time had there been any paralyses or convulsions. The urine remained normal at all times.

Briefly, therefore, we have a case of penetrating injury of an eyeball by a fishhook, the fishhook remaining in the eye for seven hours before its removal. The patient, a highly nervous, aged individual, suffered keenly during that interval by a two-mile walk along a mountain stream, a four-mile row across a lake, and a twenty-mile drive in his automobile, most of the distance being along what is known as a lumber road, requiring the most careful attention and concentration. The hook is then cut out and enucleation advised but declined. Thirty-three hours after the accident the wound was found open, ragged, and the iris covered with a thin layer of pus. Fifty-seven hours after the accident the eyeball was enucleated and a thin grayish line observed extending almost back to the optic nerve. Upon opening the eyeball and observing this line, a remark was made by the writer to those present in the operating-room that he was afraid the operation was too late and that the micro-organisms had already gained access to the brain. It is to be regretted that no microscopic examination of the eyeball was made, but the specimen was unfortunately lost. Eighty hours from the occurrence of the accident, symptoms of purulent meningitis presented themselves, death occurring on the third day thereafter, or on the sixth day following the injury.

Formerly such a case might have been reported as one of meningitis following enucleation. The earliest of such reports was made by Pagenstecher in 1873, when he recorded a case of fatal meningitis following enucleation of the left eyeball with sympathetic iridochoroiditis in the right. Subsequently similar cases were reported by Meyhoefer, Lèber, Benson, Brückner, Katzenstein, Priestly Smith, and Davidson. In 1885, Nettleship, in reporting one of his own cases before the Ophthalmological Society of the United Kingdom, collected and reviewed thirty-three others, making a total of thirty-four at that time. Out of this number five recovered after having shown well-marked signs of meningitis, while twenty-nine died. Most of the fatal cases terminated in from two to four days after the beginning of meningeal symptoms, the longest period of time being eight days after the enucleation had been performed, the symptoms manifesting themselves in almost all the cases within the first forty-eight hours.

This naturally suggests at least the possibility that the operative procedure may have had something to do with the development of meningitis in these cases, but it by no means proves that the infection may not have taken place before the enucleation was performed.

And that such is not only possible but highly probable is shown by C. Devereux Marshall in his excellent paper published in 1897 in the *Royal London Ophthalmic Hospital Reports*. Marshall, who was the curator of the museum at

Moorfields, found that 6580 eyes had been enucleated in that hospital between the years 1861 and 1896, and that there had been recorded eight fatal cases, all of them occurring after 1880. In analyzing these cases and studying them both clinically and microscopically, he found that the changes present indicated in most of them that the disease was of older standing than the symptoms would seem to indicate. Practically all of the patients were found also to have been in a condition of poor health at the time of operation. Furthermore, death from meningitis has occurred in cases of infected eyeball without operation, as in the case of Mr. Tay (*Royal London Ophthalmic Hospital Reports*, vol. 7, p. 506). Mr. Tay also reports another similar case in the paper by Marshall above referred to. In the paper by Nettleship, to which I have alluded, three cases of meningitis are reported, occurring as a result of infected eyeballs in which no operative procedure was undertaken, two of these cases terminating fatally.

It has been proved definitely that many cases of meningitis have been started by an eye containing pus, and the old idea that it was dangerous to remove an eye in this condition, and that when meningitis developed it was due to the excision, probably originated, as pointed out by Marshall, from the fact that fatal cases have been reported under these circumstances. Because, however, such unfortunate events have occurred, it by no means proves they were due to the enucleation, and in fact a careful study of most of the reported cases certainly indicates that in all probability the meningeal infection preceded the operation, but the symptoms manifested themselves after the operation had been performed.

The infection may enter the brain from the eye either by passing directly backwards along the structures entering the cranial cavity by the sphenoidal fissure and optic foramen, or by means of the blood and lymph stream. When entering by the first route, the post-mortem examinations have shown the base of the brain to be the most affected. If the infection enters, however, by means of the blood or lymph stream, the post-mortem examination is apt to reveal trouble in the sinuses and on the surfaces of the brain.

In the case herewith reported it would seem probable, because of the thin grayish line extending almost back to the optic-nerve entrance, that the infection entered the brain by way of the optic nerve, and that had the eyeball been removed at a sufficiently early period the meningitis might have been prevented

The conclusion to be drawn is that, given a case of infected eyeball in which excision must be performed, the earlier it is done the less probability will there be of the infective material having passed to the brain.

The summary of Mr. C. Devereux Marshall's paper is of such interest in this connection that it is added:

"1. Meningitis may be present for a certain time without there being sufficient symptoms to enable one to diagnose the disease.

"2. Meningitis has been known to follow other operations besides the excision of suppurating eyes, and cases are also recorded in which the excision of an eye which was not suppurating has been followed by death from meningitis.

"3. The changes seen in many cases indicate that the disease is of older standing than the symptoms would appear to indicate.

"4. Infection may occur at any time from an eye which is suppurating, and the longer the pus is shut up in the eye the greater is the risk, and the greater will be the absorption of the products of suppuration.

"5. There are two ways in which meningitis may arise: (*a*) by direct extension along the optic nerve and structures passing through the sphenoidal fissure; (*b*) by infective material being carried along the vessels.

"6. The sooner the pus is got rid of the better, and if it is thought undesirable to excise the eye, it should be at once opened, the contents completely removed, the sclerotic thoroughly scrubbed out, and both it and the surrounding parts rendered aseptic. Owing to there being no clear cornea to injure, a far stronger antiseptic may be employed than would be possible if a seeing eye were present.

"7. As the products of putrefaction may have soaked into the sclerotic and have infected the surrounding parts, it is far better to remove it; good drainage is then insured, and every piece of useless and suppurating tissue is removed."

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LOSS OF VITREOUS IN THE INTRACAPSULAR CATARACT OPERATION AND ITS PREVENTION.[1]

By W. A. FISHER, M.D., Chicago.

(*With nine cuts in the text.*)

IF a cataract operation could be performed without the loss of vitreous, it would make a great step forward, and, if a loss of vitreous could always be avoided when the lens was removed in its capsule, then the intracapsular operation for senile cataract would be the best operation.

A loss of vitreous during a cataract operation, by any of the various methods now in vogue, may occur in a certain per cent. of operations; and, when a loss precedes the exit of the lens, the complication is considered one of great importance. It is admitted by operators, who are familiar with all methods of operating, that a loss of vitreous occurs more frequently in the intracapsular operation than by the capsulotomy method, and if this loss of vitreous could be avoided, the intracapsular operation could be performed without any more danger to the eye than by other methods.

Cause of Loss of Vitreous

There are two causes for the loss of vitreous: First, the patient may be unruly, but this is not often; and, second, the fault is with the operator, who does not take all precautions. Some time before the operation the patient may be given a sedative to keep him quiet; but if the operator gives him pain during any part of the operation, he cannot be expected to keep his eye quiet. The greatest responsibility rests upon the operator, and he should protect the patient as much as possible against all accidents. The two great factors producing loss of vitreous are pressure upon the eyeball by the lids and pressure upon the eyeball by the operator in removing the lens. Pressure upon the eyeball by the lids can be practically eliminated by discarding all kinds of specula and holding the upper lid away from the eyeball by my retractor and double hook (Fig. 1).

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[1] Read in part at meeting of Am. Acad. of Ophth., etc., Boston, Oct., 1914.

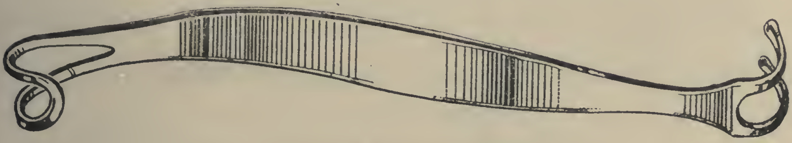

FIG. 1.—Author's lid elevator and double hook.

Technic of the Lid Hook

To operate upon the right eye, the assistant stands on the left side of the patient, introducing the lid elevator under the upper lid, holding it up with his right hand, his fingers resting upon the patient's nose, and the lower lid is kept down with his left thumb (Fig. 2). When operating on the right eye, the operator stands behind the patient during the incision and the iridectomy and to the right side and in front of him while extracting the lens. When the incision has been finished and the iridectomy performed, the assistant removes the lid retractor and introduces the double hook. In this position of the lid the operation is finished and the lid closed before removing the instrument, a second assistant or nurse being necessary to hold the eyebrow up during the operation and another to fix the eyeball while making the iridectomy. When operating on the left eye, the surgeon makes the incision with his left hand, and the assistant keeps the same position as in operating upon the right eye, but if he makes the incision upon the left eye with his right hand, standing on the left side and in front of the patient, the assistant should stand upon the right side of the patient, holding the lid up with the lid elevator in his left hand and keep the lid down with the thumb of his right hand. When the incision is finished, the assistant removes the lid elevator, stands upon the left side of the patient, introduces the double hook when the iridectomy is made and the operation finished, with the assistant's fingers resting upon the side of the face, instead of nose, and the same position assumed as when operating upon the right eye. The operator stands upon the right side of the patient in delivering the lens in either eye. There are two positions for the double hook, one for holding the lid up and away from the eyeball (Fig. 2), the other, the patient being nervous or an impending danger of loss of vitreous, when the lid should be pulled down toward the patient's feet (Fig. 3). A little drilling will soon make any physician or nurse a good assistant.

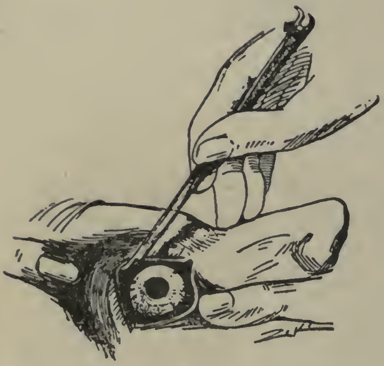

Fig. 2

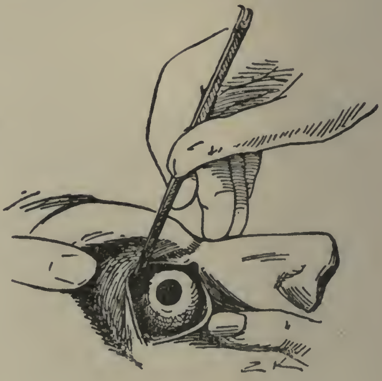

Fig. 3

Fig. 2.—Author's double lid hook holding the upper lid away from the eye, keeping all pressure from the globe, the assistant's fingers resting upon the patient's nose. The thumb of left hand holding the lower lid down, a second assistant holding the brow up.

Fig. 3.—The same as Fig. 2 except the double hook is pulling the lid forward or down to take off all pressure in impending or actual loss of vitreous, the double hook being depressed to keep from slipping out from under the lid.

Pressure upon the eyeball by the operator in removing the lens need not be so great in the capsulotomy as is required in the intracapsular method, and the pressure in the intracapsular method can be greatly modified by the use of my new instrument (Fig. 4). This instrument is a modification of the Smith spoon with a Smith spoon on one end and a very sharp needle on the other. The spoon end is used for the delivery of the lens when vitreous has escaped. I do not know of any instrument that will do as well for that purpose. The needle is used to avoid loss of vitreous. The danger of loss of vitreous in the intracapsular operation occurs when the lens appears to be larger than the corneal opening and pressure is exerted that either bursts the capsule or causes loss of vitreous before the lens has been delivered. At this critical moment, when the operator has made what he considers safe pressure and the lens does not move but is sticking in the gaping corneal wound, the point of the needle is stuck into the lens and the lens gently lifted past the obstruction, when the delivery is finished by pressure upon the cornea with the hook according to the Smith method (Figs. 5, 6, 7).

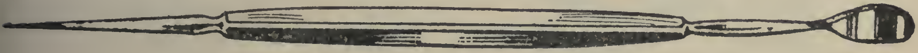

Fig. 4.—Author's needle and Smith spoon.

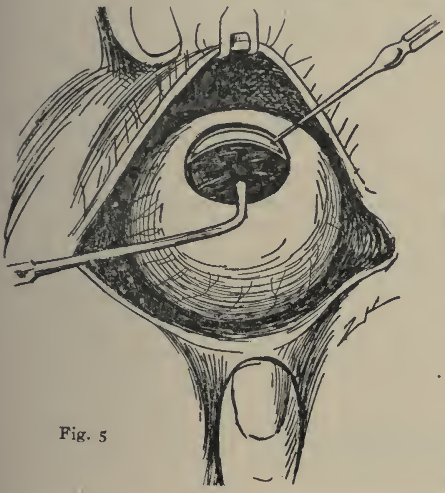

Fig. 5

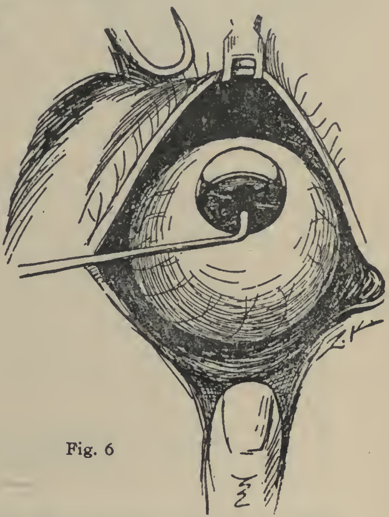

Fig. 6

Fig. 5.—Author's lid elevator, assistant holding the upper lid away from the eye with right hand, the lower down with the thumb of the left hand, a second assistant holding the brow up. The hook is laid flat upon the cornea and pressure is made directly back toward the optic nerve. Safe pressure has been made but the lens will not move forward. The needle is inserted into the lens and it is gently lifted past the obstruction and the operation finished by the Smith technic. See Figures 6 and 7.

Fig. 6.—A continuation of Figure 5. Author's double lid hook holding the upper lid away from the eyeball with the right hand, the lower down with the thumb of left hand. A second assistant is holding the brow up, while the Smith hook is making pressure directly backwards towards the optic nerve. The pressure is kept up until the lens has passed the equator.

It would seem that anyone should be able to deliver the lens in its capsule after an experience of 576 operations under the guidance of Colonel Smith. And, I am satisfied from this experience that any operator will have an occasional loss of

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vitreous by using pressure alone, and be compelled at times to deliver the lens with the spoon when loss of vitreous has preceded the delivery of the lens (Fig. 8).

I believe loss of vitreous can be made as infrequent by the intracapsular method with the Smith technic as occurs in the old operation with the old technic. It is not possible for me to state how many capsules will burst when the needle is used, because it may either burst when excessive pressure is used or when a loss of vitreous occurs. When Dr. Vail of Cincinnati and the late Dr. Greene of Dayton, Ohio, returned from India and explained the Smith technic to the Chicago Ophthalmological Society, they told us to use the spoon to make a little extra pressure when the lens appeared to be sticking in the gaping corneal wound. Five years later, when I was in India, I found the spoon practically discarded for producing pressure and only used in impending or actual loss of vitreous. Smith made this change because he found that doctors coming to him had great difficulty in using the spoon, and that their left hands could not be used as well as their right. He now uses the spoon only in impending or actual loss of vitreous, depending upon the hook for pressure upon the lens. I would suggest that the spoon be used only when vitreous has escaped and, if the needle is used when there is impending loss of vitreous, the spoon will seldom be used. The more skillful the operator is, in removing the lens in its capsule, the less often will he be called upon to use the needle or the spoon. The Smith technic should be mastered by good operators on pigs' eyes before an intracapsular operation is attempted. The needle is used only in difficult cases, and no more serious accidents are likely to occur than a bursted capsule; and, in that event, the result would be the same as though the old operation had been performed, and the capsule left in the eye. If the capsule has been ruptured in a tumbler—that is, a lens which is delivered lower side first—the zonula will have been broken below and the capsule will be found protruding from the corneal wound when it can be easily removed with a plain dissecting forceps.[1] If the capsule has been ruptured either by excessive pressure or by the needle while the lens is being delivered in the upright method, as in the immature, the toilet should be made first and then the attempt made to remove the capsule with my capsule forceps (Fig. 9). If the capsule is not removed in this manner, a large opening will have been made in it which will usually obviate the necessity of a secondary operation. If the lids are held away from the globe in a proper manner, a bead of vitreous, but no more, may follow, and this need not be considered of any special danger.

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[1] Fisher, *Ophthalmology*, April, 1914.

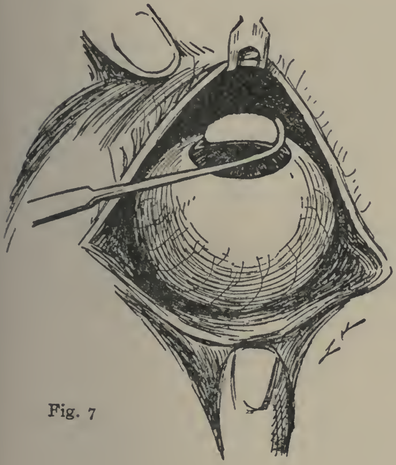

Fig. 7

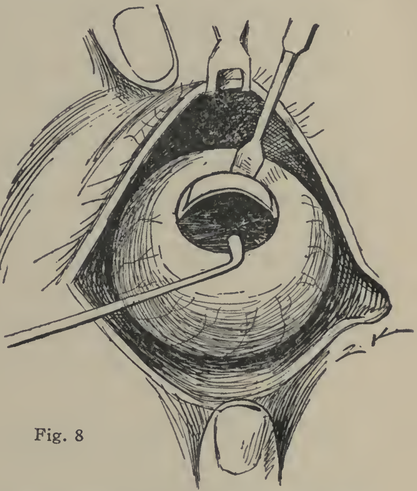

Fig. 8

Fig. 7.—A continuation of Figure 6. Author's double lid hook holding the upper lid away from the eye while the Smith hook is removing the lens, which is hanging in the wound. The hook is turned up to avoid rupturing the capsule.

Fig. 8.—Author's double lid hook holding the upper lid away from the eyeball, the lower down with thumb of left hand. A second assistant is holding up the brow. A slight amount of vitreous has escaped, pressure of the hook has been removed, and the Smith spoon introduced behind the lens. When the spoon is well in behind the lens, pressure is again made upon the cornea with the hook and the lens is expelled, using the spoon as a background to make pressure. In this manner the minimum amount of vitreous will be lost. This technic can be fairly well mastered by practice upon a dog's or pig's eyes in a mask.

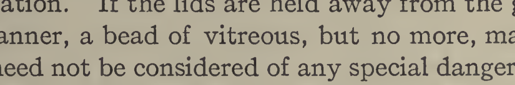

Fig. 9.—Author's capsule forceps.

I hesitate to modify the Smith technic, and he may not accept this suggestion, but I believe it will be of great benefit to less skillful operators than Smith. Smith is a very careful observer and will accept reasonable suggestions from anyone and try them out. I offered several suggestions when I was working with him last year, and I cannot recall any that he did not try except the needle. I proposed the needle to him when I found the lens sticking in the corneal wound and felt as though the capsule would burst or a loss of vitreous would occur if I made more pressure, but he told me he thought it would be safer for me to stick to the spoon. I did not mention the needle to him again because I was not sure that it would be of any value, and furthermore I was not in India to teach Smith how to operate. As soon as I arrived in Chicago, I had the instrument made and began its use at once and I am using it now in every case when I feel that there is danger of losing vitreous. I have used the needle long enough to convince myself that it is a valuable instrument, and I believe it will aid operators in the extraction of the lens in its capsule.

Few Operators Are Ambidextrous

Operators who feel that they cannot depend upon their left hand could have an assistant introduce the needle when it is necessary to give this little assistance. The technic of the needle can be obtained by operating upon pigs' eyes in a mask. One eye will be quite sufficient for a long practice, because when operating upon pigs' eyes it is not necessary to remove the lens but simply to introduce the needle to assist the lens towards the exit, then let it slip back into the eye and repeat the technic as many times as is necessary to master it. The spoon delivery can be mastered in the same manner. Operators who do not have competent assistants can perfect them by practice upon animals' eyes. I formerly advised the use of the capsule forceps when the lens could not be delivered by safe pressure, and I am now recommending the use of the needle at this critical time.[1]

We are all striving to avoid loss of vitreous, post-operative inflammation, secondary operation on the capsule, and infection, and to give our patients the best possible vision. If we open the capsule and extract the lens but leave the capsule in the eye, a foreign body is retained which has a tendency to cause post-operative inflammation, necessitates secondary operation, and increases the danger of infection, because we expect and often get post-operative inflammation which makes it imperative that we open and treat the eye before the corneal wound is closed and thus increase the danger of infection on account of repeatedly opening the eye. If a successful operation has been performed by the old method, the patient is either dismissed at the end of two weeks or more to return for a needling if necessary, or is requested to remain in the hospital until this has been done. The patient is usually under observation in or out of the hospital more than twice as long as would be required if the lens has been removed in its capsule; and, when he is discharged and a needling has been performed, we cannot be sure that the capsule will not obstruct his vision at some future time.

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[1] Fisher, *Ophthalmology and Oto-Laryngology*, 1910.

Disadvantage of the Intracapsular Operation

Loss of vitreous seems to be the one great disadvantage of the intracapsular operation. If this could be overcome I believe the intracapsular operation would be the operation of choice.

Advantages of the Intracapsular Operation

First. The intracapsular operation can be performed as soon as the patient is unable to attend to his ordinary duties.

Second. The intracapsular operation is especially indicated in immature cataract.

Third. The patient is operated upon when his health and spirits are good.

Fourth. Post-operative inflammation rarely follows the intracapsular operation.

Fifth. Secondary operation is not necessary.

Sixth. Less danger of infection.

Seventh. Average time in the hospital, less than half as long as in the old operation.

Eighth. Visual results better.

I have arrived at these conclusions on account of having operated by the capsulotomy method for more than twenty years and of having performed more than six hundred intracapsular operations.

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OPHTHALMOPLEGIA INTERNA, THE RESULT OF LEAD POISONING.

By L. D. BROSE, M.D., Ph.D., F.A.C.S., Evansville, Ind.

OCCUPATIONAL diseases, while not holding the importance for the eye specialist that they do for the general practitioner, are nevertheless not to be wholly neglected by him, since, aside from a diagnostic standpoint, and our interest in the conservation of vision movement, it should be remembered that certain of our States have made it obligatory for all physicians to report to designated State authorities such occupational diseases as may come to them for treatment.

The case I have to report presents the following history:

J. T. C., æt. 25 years, married, and a foreman painter in a very large buggy factory, consulted me November 15, 1913, because of sight failure. He has always enjoyed good health, is not addicted to tobacco or alcohol, nor taken medicine of any kind recently. Syphilis is positively denied. About his clothing I at once detected a strong odor of paint, and he admits that he has been very much in contact with lead during long working hours. Aside from difficulty in seeing, however, he has no complaint. The eyes were not inflamed, but both pupils were widely dilated, but responsive to convergence. Vision in either eye is $\frac{15}{50}$ for distance, while near he is unable to read smaller than Sn. 4. The sight in the right eye was improved with + 0.50 cyl. ax. 90° to $\frac{15}{20}$, and that in the left eye with + 0.50 spherical likewise $\frac{15}{20}$ for distance. Near, either eye read Sn. 0.50 with the help of + 4.50 spher. Ophthalmoscopic examination disclosed no evidence of disease in the fundus, and a careful examination on the perimeter disclosed no loss in the visual fields for either color or form. A diagnosis of nuclear lead palsy was made notwithstanding the absence of general symptoms, and the patient cautioned to abstain from handling lead as much as possible. Iodide of potash

> three times daily was prescribed, and a cathartic dose of sulphate of magnesia. Patient made a rapid recovery and I did not see him again until April 13, 1914, when he came because of recurrence of poor sight. Again I detected a very strong odor of paint about his person, and upon questioning him he admitted that recently his work had been unusually heavy and that he had found it necessary to work overtime and spend more hours in the paint-shop than usual. The pupils were normal in size, reacted well to light and convergence. A test for visual acuteness gave the following: O. D. $\frac{15}{20}$, improved to $\frac{15}{15}$ with + 0.25 cyl. ax. 90°; O. S. $\frac{15}{15}$. Near vision either eye Sn. 1.00, improved to finest Sn. with the help of + 1.50 spher. There was no detectable disease in the fundus and the visual fields were normal. Treatment: Purgative doses of sulphate of magnesia twice weekly, and iodide of potash, grains five, three times daily. He was again advised to abstain from handling paint as much as possible. The result was a rapid restoration of his sight.

Cases of palsy of the eye muscles due to plumbism cannot be very common, since Dr. J. C. Wilson[1] makes the statement that paralysis of the face or eye has never been observed in consequence of lead poisoning. W. F. Norris[2] states that in fifteen thousand case records in hospital practice only three undoubted cases of lead amblyopia have presented themselves; while Uhthoff says, "as compared with the number of cases of toxic amblyopia from other causes, that produced by lead represents a small percentage," only one case of lead amblyopia being found among one hundred and thirty-eight cases of toxic amblyopia analyzed by him. Of the eye disorders resulting from lead poisoning, affections of the optic nerve occur oftenest. Oliver[3] differentiates two forms of neuroretinitis. The acute form, seen in connection with lead encephalopathia, in persons who have been employed in handling lead but a short time. These patients complain of headache, vomiting, sudden blindness, and convulsions. As a rule, atrophy of the optic nerve ensues, the disk becoming pale, of irregular contour, with narrowing of the retinal arteries. The urine may be free from albumin and the brain and meninges without material alteration. The second form is seen in chronic lead poisoning, often in association with kidney disease and albuminuria. Amblyopia, of transient duration and sudden in onset, without appreciable ophthalmoscopic changes, and due to a direct effect of the lead on the nerve centers, akin to what takes place in uræmic amaurosis, has been reported in some of the cases. However, the neuritis may precede the albuminuria and end in atrophy long before kidney symptoms arise. The field of vision may be that of typical retrobulbar neuritis with its central scotomas, or there may be concentric contraction for form and colors, or contraction and peripheral relative scotomas. Bihler[1] reports a case of complete homonymous right-sided hemiachromatopsia. Since there are no special eye symptoms that permit of a diagnosis of lead poisoning, the history of the patient's exposure to lead absorption in connection with such general symptoms as pallor of the skin, reduced hæmoglobin, general muscular weakness, rheumatic pains, especially in the back and joints, gastrointestinal symptoms, colic without tympanites or temperature elevation, constipation, loss of appetite, and vomiting must be sought for. General nervousness, persistent headache and dull mentality with wrist drop, bluish line on the gums, basophilic degeneration of the red blood cells, and detection of lead in the urine are conclusive evidence of plumbism. The seat of the eye lesion in lead poisoning is, as a rule, either nuclear or peripheral. The retinal arteries may suffer narrowing through endarteritis, even to obliterans in places.

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[1] Pepper, *System of Medicine.*

[2] Norris and Oliver, *System of Diseases of the Eye.*

[3] Oliver, *British Med. Journal*, Mch. 21, 1891.

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[1] Bihler, *Knapp's Archives of Ophthalmology*, vol. xxx., No. 4, p. 508.

CONCERNING REMOVAL OF THE EYEBALL.

I.

EXENTERATION *VERSUS* ENUCLEATION.

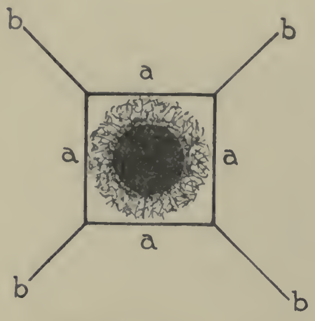
By HARRY S. GRADLE, M.D., Chicago.

(*With two cuts in the text.*)

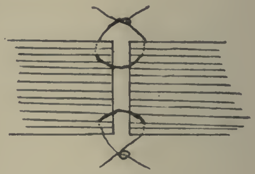
IN compiling this series of cases of removal of the eyeball for various reasons, it seemed advisable to discuss the subject from three aspects. The material was divided, therefore, into three separate papers, as the consideration of each phase was too lengthy. This, the first of the triad, is devoted to the question as to whether enucleation is preferable to exenteration, or *vice versa*, and in which case each operation is applicable. In the second article of the series will be considered the implantation of fat into the orbital or scleral cavities after removal of the visual organ, while the third will deal with ciliary ganglion anæsthesia.

Among American ophthalmologists, the practice of exenterating the eyeball is confined almost exclusively to cases of panophthalmitis. Removal of the eye for other causes is usually performed by the simpler operation of enucleation. This prejudice in favor of the latter operation is almost nationwide and deserves a few words of comment. The ensuing discussion is based upon the operations of enucleation and exenteration that have been performed during the past four years in the German University Eye Clinic in Prague. To Professor Elschnig, who kindly allowed me the use of this material and counseled me during the compilation, I am deeply indebted.

There is no necessity of detailing at length the technic of either operation, for admirable descriptions of both are to be found in Czermak–Elschnig, as well as in Beard, Meller, and other standard textbooks of ophthalmic surgery. Ganglion anæsthesia was used whenever possible, the details of which will appear in a future article. In enucleations, the technic did not vary from that employed in this country. The endeavor in eviscerating was to leave the concavity of the sclera free from any adhering particles of choroid, and to this end the uvea was loosened with a spatula before endeavoring to scoop out the intraocular contents. After excision of the cornea by a quadrangular incision (Sketch 1), the ciliary body was frequently found to be adherent to the sclera at the points a–a. These adhesions were loosened with the small cyclodialysis spatula. Especially in chronic iridocyclitis, adhesions between the anterior portions of the choroid and the sclera were found to be present; these were loosened in the same way. The contents of the globe were then scooped out with the dull Bunge spoon, after which all hemorrhage was stopped by pressure alone. When no more blood was present, the cavity was inspected for choroidal remnants, which, if found, were removed with a sharp Bunge spoon. Four flaps of the scleral mouth were then made by four scleral incisions (Sketch 1-b–b), and the wound either closed and covered with conjunctiva, or drained with gauze, as the case required. In case of complete closure of the scleral cavity, the two vertical flaps were first sutured together with buried knots (Sketch 2), and then the horizontal flaps.



SKETCH 1



SKETCH 2

The following table gives a brief résumé of the 153 cases and needs but little explanation. The diagnoses were empirically divided into three main and two subheadings in the endeavor to formulate indications for the type of operation. Under "Acute Mycotic" are classed those cases of acute bacterial inflammation whose ordinary course was less than fourteen days in length. The subheading of "Acute Non-Mycotic" includes the acute non-bacterial inflammations of short duration as traumatic iridocyclitis. "Chronic Mycotic" inflammations cover the low-grade infections existing for more than fourteen days, while the "Chronic Non-Mycotic" subheading is represented by such cases as traumatic iridocyclitis that could lead to a sympathetic ophthalmia (Schleichende Iridozyklitis"). Under "Non-Inflammatory" are classed cases of glaucoma, Atrophia bulbi dolorosa without uveal inflammation, traumatic uveal prolapse, etc.

	Enucleation.	*Exenteration.*
Male	48	71
Female	19	15
Total	67	86
Ganglion Anæsthesia	51	38
Other Anæsthesia	16	48
Diagnosis:		
1a. Acute Mycotic	8	44
1b. Acute Non-Mycotic	3	13
2a. Chronic Mycotic	1	0
2b. Chronic Non-Mycotic	13	8
3. Non-Inflammatory	42	21
Results:		
Healed smoothly in less than 10 days	62	55
Healing prolonged more than 10 days	5	17
Suppuration	—	2
Suppuration and Scleral Sloughing	—	12
Secondary Paraffin Injection	—	14

The course of healing was again empirically divided into a period of less than ten days, and a period greater than ten days merely for the sake of classification. The few cases of suppuration and subsequent scleral excision were classed by themselves. Secondary paraffin injections were made fourteen times after evisceration in the endeavor to produce a larger stump, more freely movable for the prothesis.

As can be seen from the table, 42 of the 67 enucleated cases, or 62.5%, were operated upon by this method because of a non-inflammatory condition; while among 86 cases that were eviscerated, the operation was performed 57 times, or in 66.2%, because of acute inflammatory trouble. By far the majority of the enucleated cases healed smoothly in less than ten days. Among the eviscerations, 17 required a greater period of time for healing. In two further cases there was suppuration following the operation, certainly due to pre-operative infection of the sclera, as both were cases of panophthalmitis, and bacterial masses remained imbedded in the tissue despite careful operative technique. Twelve more cases suppurated, combined with sloughing of the sclera that required a secondary excision of the sclera. Ten of these were panophthalmitis, while in the other two the slough was perhaps due to the implantation of too large a pith ball. In 14 cases, a secondary paraffin injection was made into the scleral capsule in the hopes of producing a larger stump.

Before deducing any conclusions from the statistics, it becomes necessary to discuss the advantages and disadvantages of each operation. Enucleation is without question the simpler, and hence more apt to be chosen by the inexperienced operator. Not only this, but the operation can be performed more rapidly so that the patient remains a shorter time upon the table. This, too, lessens the chances of shock, which may occur even in phlegmatic patients under a perfect ganglion anæsthesia. From an economic standpoint, enucleation offers greater advantages, for the patient's stay in the hospital seldom exceeds three to five days and frequently is less. The patient's return to a sphere of useful activity is also hastened, as the prothesis can be fitted usually in less than two weeks. In tumors of the globe, enucleation is, of course, the only procedure to be considered to prevent metastases or an immediate return of the new-growth.

In one other condition has enucleation been considered the only operation to prevent further trouble. That is, traumatic iridocyclitis of that nature that leads to a sympathetic ophthalmia. But it is well known that the operation is futile if performed too late. The question naturally arises: "How long after an enucleation before the patient is no longer in danger of the development of a sympathetic ophthalmia?" Schirmer (1) agrees with Czermak (2) that fully four weeks must elapse before there is such a positive assurance, although in one authentic case the inflammation developed thirty-two days after enucleation—Snell (3). Other cases with an even greater interval of time have been reported, but their authenticity must be questioned. As example, in a case reported by Mathewson (4), the author himself questions whether or not the inflammation, developing thirty-one days after enucleation, was not an iritis serosa. Not every iridocyclitis developing in a sound eye (even accompanied by the formation of a "Schwarte"), following injury to the fellow eye, can be classed under the heading of sympathetic ophthalmia, unless every other possible etiological factor has been exhausted. The diagnosis of "Sympathetic Ophthalmia" must be made by exclusion, not by inclusion. As illustration, may be cited a case reported by Calhoun (5) that developed an iridocyclitis seven days after iridectomy of the fellow eye. Removal of the operated eye caused no improvement, but complete recovery followed repeated doses of neosalvarsan, despite a negative Wassermann. A luetic iridocyclitis is not necessarily accompanied by a positive complement fixation. Another illustrative case was reported by Elschnig (33). A patient developed an infected iridocyclitis following a senile cataract extraction, which refused to yield to treatment. Five months later, a neuroretinitis appeared in the other eye, but was proven to be due to sphenoidal and ethmoidal suppuration. The inflammation in the second eye clinically resembled a "sympathetic neuroretinitis," but etiologically was proven to be upon an entirely different basis.

The appearance of a sympathetic ophthalmia, late after enucleation, can be understood easily in the light of the Elschnig anaphylactic theory. The absorbed uveal antigens, that are gradually sensibilizing the uvea of the second eye, remain in the blood serum for a considerable period after the source of absorption has been removed. This has been conclusively demonstrated by Hegner with the Aberhalden ninhydrin reaction, and the same author showed that these bodies remained persistent for at least a week after the offending injured eye had been removed.

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On the other hand, the operation of enucleation presents several serious disadvantages. There is sometimes an æsthetic or religious objection on the part of the patient toward losing the entire eye, even though the indications for enucleation be absolute. The claim was raised many years ago that total removal of a suppurating eye (panophthalmitis) could and would lead to a spread of the infection cranialwards, *i.e.*, that a meningitis would develop. I shall discuss this question later. Enucleation is not necessarily an absolute prevention against the return of tumors, even though the new-growth has not perforated the sclera. For tumors of the amputated optic nerve have developed not infrequently after enucleation, and in one case at least there appeared a melanotic sarcoma of the nerve stump—Hartman (6).

Unquestionably the nodule remaining in the orbit after an enucleation is smaller and less freely movable than the stump following an evisceration, and unfortunately we are unable to improve the size or motility of this nodule after healing has occurred. Injection into the orbit of any substance as paraffin is dangerous because of the great possibilities of embolism and wandering of the material through the tissues. I use the term "nodule" advisedly. After an enucleation, the union of the conjunctival wound shrinks to a small hard, round nodule, with radiating connective-tissue strands, irrespective of the type of suture used for closing the wound. To this nodule are adherent the ocular muscles, and the motion of the prothesis is due to their traction upon this conjunctival nodule.

Evisceration possesses several advantages over complete removal of the eyeball. Frequently, the æsthetic or religious objections of the patients can be overcome by leaving the scleral capsule within the orbit and removing "only the sick contents of the eye." Hemorrhage is distinctly less. Because of the sclera, which eventually shrinks to a hard lump, the resultant stump is apt to be large and freely movable. Moreover, a small scleral stump can be enlarged within a few days after operation by a secondary injection of paraffin into the capsule. Cosmetically, simple evisceration yields about the same results as enucleation, combined with implantation of fat. This method will be discussed in the next article.

The disadvantages of evisceration are immediate. By that

I mean that the immediate sequelæ of the operation are more unpleasant than those of enucleation, in addition to the fact that the former operation is technically more difficult. The patient, unquestionably, suffers more pain for the succeeding three or four days from the unavoidable orbital and conjunctival œdema. The length of stay in the hospital is usually doubled or trebled, and the prothesis cannot be fitted under four to six weeks. Of course, evisceration is out of the question in tumors of the globe, and, *unless the technique is perfect*, should be avoided in cases of iridocyclitis that could lead to a sympathetic ophthalmia.

Briefly considered, then, enucleation is simpler and easier to perform; economically, saves a great deal of time for the patient; and is more nearly a perfect protection against tumor metastases. On the other hand, exenteration is less of a mental shock; causes less hemorrhage; cosmetically, yields far better results; allows of improvement in the size of the resultant stump; offers less dangers in purulent inflammations; and, if carefully performed, is a safeguard equal to enucleation in preventing sympathetic ophthalmia.

Two points that require discussion at length remain to be considered. In how far does enucleation overshadow evisceration in the prevention of sympathetic ophthalmia? And what greater danger from meningitis does the patient run in the enucleation of a panophthalmitic eye rather than in the evisceration?

If we accept Roemer's theory as to the cause of sympathetic ophthalmia, it is a strain upon the imagination to understand why evisceration or, for that matter, enucleation should prevent the development of the disease. The fanciful organism that is supposed to cause the trouble must be selective in the matter of culture medium in that it will flourish only in uveal tissue. Owing to the physiological lack of continuity of uvea, it must be transmitted from one eye to the other by the circulating blood or lymph streams. If the offending eye (the primary culture) be removed before the circulatory system is invaded, the second eye cannot be attacked. But if the mischief-maker is already in the blood or lymph paths, an outbreak of sympathetic ophthalmia *may* result, *although the organism may have to lie dormant in some unknown recesses for a* *period up to thirty-two days in length.* Such behavior is, as yet, unknown among our large number of well-classified and well-studied organisms. Nor is it easy to understand why the organism refuses to attack the sound uvea until at least fourteen days have elapsed from the time of injury. For the histological picture in the offending eye shows exactly the same sort of inflammation as in the second eye [Wagenmann (7)], although the inflammation assumes its characteristics within a few days after injury.

On the other hand, the anaphylactic theory of sympathetic ophthalmia, advocated by Elschnig (8) in 1910, allows of a simple explanation of these facts. Before the disease can appear in the second eye, the entire system must be sensitized by the absorption of broken-down uvea, in the form of antigens, and this requires at least fourteen days to two weeks. After this sensitization has occurred, removal of the source of antigenic absorption has no effect upon the other factors that are the exciting causes of the anaphylactic reaction. This source is the traumatically-inflamed uvea, and it can be removed by enucleation, or equally well by *careful* evisceration. I emphasize careful, for remnants of choroidal tissue left within the scleral capsule are antra for antigenic absorption that can easily lead to a sympathetic ophthalmia. Snellen (9) reported two cases of sympathetic ophthalmia that followed evisceration, and in both eviscerated stumps he found microscopic evidences of inflamed uvea. Schieck (10) reported such a case with the histological findings of a mononuclear infiltration of small choroidal rests in the eviscerated stump. A similar case occurred in my own practice (11). Various authors have published cases of sympathetic ophthalmia developing months to years after a Mules operation, and tend to ascribe it to irritation by the implanted ball. Brobst (12), Limbourg (13), Campbell (14), Oliver (15) reported such a case and examined the stump histologically. He found a mononuclear infiltration and a wide dispersion of the leucocytes and was consequently led to the belief that sympathetic ophthalmia is not a bacterial disease. A similar case was published by Gifford (16) who collected from the literature 27 cases of sympathetic ophthalmia developing after evisceration, but nearly all without examination of the offending stump. There is no doubt but that all of these cases, if carefully examined, would show choroidal remnants within the scleral capsule, the source of antigenic absorption. Goldzieher (17 and 18), however, is even more radical in his views than the majority of authors. In impending sympathetic ophthalmia, he claims to have found an infiltration of the sheaths of the ciliary nerves, a peri- and an interstitial-neuritis, and believes that the disease is transferred from the first to the second eye along these paths. As a preventive measure, he insists upon exenteration of the *orbit*; it is scarcely necessary to comment upon this proposition.

Enucleation, *if performed in time*, is a positive prevention of sympathetic trouble. But how many cases of sympathetic ophthalmia occur where the enucleation has been performed too late? The majority of cases of this disease are due to this factor, and a reference to the literature is not even necessary. Thus the question resolves itself into not "what is the operation of choice," but rather "when must the operation be performed?" For the majority of the cases reported of sympathetic ophthalmia developing after evisceration have been found to be due to choroidal remnants in the eviscerated capsule.

The second question as to whether enucleation of a panophthalmitic eye is liable to result in meningitis is still a bone of contention among various authors. von Graefe (19) in 1863 was the first to report such an occurrence, and since his original communication 63 cases with fatal termination have been recorded in the literature. The Brueckner-Deutschmann report (20) contained 26 cases occurring up to 1885, and within the next three years Becker (21) was able to collect 17 more. Individual cases were added by Ramm (22), Kalt (23), Risley (24), Enslin-Kuwahara (25), and others. Fifty-eight cases were collected and studied by Kantorowitsch (26), who included 118 cases of enucleation performed in the Haab clinic in her report. She concluded that enucleation was a safe operation unless the panophthalmitis were of the intensely virulent type. Darrieux (27) enucleated in 42 cases of panophthalmitis with three resultant deaths; but in none of them did autopsy reveal any lesions along the course of the optic nerve or in the chiasm, although isolated patches of meningitis were present in two of them. Basing his conclusions upon these experiences, he was not willing to acknowledge that enucleation of a purulent eyeball increased the possibilities of the development of a fatal meningitis. On the other hand, Jacqueau (28) reported a case of panophthalmitis that was enucleated under a general anæsthesia, with the result that a serous meningitis developed and proved fatal on the fifth day. Autopsy was performed upon 11 of the fatal cases reported by Becker (29), and in nine of them no pathological changes were found along the course of the optic nerves or in the chiasms. An exceedingly instructive case, and one that tends to support the views to be expressed later, was detailed by Stevenson and Adair Dighton (30). An eye, destroyed by a pneumococcic infection, was enucleated. Death resulted four days later from meningitis. At autopsy the optic nerve and chiasm were found to be devoid of any pathological changes. The exudate from the meningeal inflammation contained a very few isolated pneumococci of low virulence and a large number of active ray fungi. The source of these latter was traced to an old infected sphenoidal cavity that was filled with pus from an actinomycotic infection.

The development of a fatal meningitis following the enucleation of a panophthalmitic eye is an old saga that has been accepted by the majority without question, though but few have investigated the why and wherefore. Such an infection must have one of three sources: from the suppurating eye and subsequent transmission along the optic nerve or its sheaths or especially along the orbital veins (as a septic thrombophlebitis) to the meninges; from an infection implanted during the operation and transmitted along the same paths as in the first case; or from a purulent focus elsewhere in the body, as a suppurating joint or prostate, and infection of the meninges by metastasis.

I have not been able to find a single case in the literature of proven passage of infectious material, extra-vascularly, through any of the optic channels. In all of the autopsy reports that have been at my disposal, have the optic nerves and chiasms been shown to be uninfected. Randolph (31) admits the possibility of such a transmission, but believes it to be exceedingly rare, basing his views upon animal experiments.

Nevertheless, he advises enucleation only in exceptional cases, so strong is the hold of von Graefe's teaching. Transmission of the infecting organisms through the orbital vessels, particularly the veins, may and does occur, but probably owing to a direct infection of the vessel walls, intraocularly, *before the operation takes place.* Consequently it is not probable that in such cases evisceration would be more of a preventive measure than simple enucleation.

Infection from operative procedures is, in this day and age, fortunately a rare occurrence. In Becker's report (32), there were two cases of non-infectious ocular trouble that unquestionably came under this heading. It is impossible, however, to estimate its frequency, and a discussion of this phase of the question is here out of place.

In dealing with a metastatic panophthalmitis we cannot be justified in attributing a subsequent meningitis to operative interference, unless a direct path of infection through the orbit can be demonstrated. For it is well-known that metastases of purulent processes to the meninges are of frequent occurrence, irrespective of extraneous influences.

Based upon these facts, it is not justifiable to assume that enucleating an eye suffering from panophthalmitis (in the sense employed by Fischer and Von Arlt) is dangerous to the life of the patient in that a fatal meningitis will result. But, lacking positive evidence to the contrary, it is advisable to eviscerate the eyeball in the presence of an intensely purulent panophthalmitis.

CONCLUSIONS: There can never be any absolute indications formulated as to when to enucleate or when to eviscerate an offending eyeball.

But, with the previously mentioned factors in view, evisceration may be performed in all cases except those of malignant growth and phthisis bulbi, provided care be taken that no choroidal remnants remain adherent to the scleral capsule.

On the other hand, enucleation may be performed in all cases with the possible exception of very virulent panophthalmitis.

From an economic standpoint, enucleation is to be preferred when possible; but from a cosmetic viewpoint, evisceration is the operation of choice.

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EPIBULBAR SARCOMA, WITH MICROSCOPIC AND MACROSCOPIC SECTIONS.[1]

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(*With one drawing in text and three photographs on Text-Plate I.*)

THE comparative infrequency of sarcomata in this location, and the wide variance of opinion as regards their malignancy, prompt me to report the following case, together with a résumé, of some of the most important contributions on the subject up to the present time.

Mrs. Freda Meissner, age 74, was first seen by me at the Manhattan Eye, Ear, and Throat Hospital on April 6, 1914; family history negative; aside from a tumor of the left breast, which was removed 25 years ago, her general health has always been good. Two years ago she had trouble with the left eye, the nature of which she did not understand; the physician whom she consulted treated the eye with bluestone for some time, and the eye finally became quiet, and treatment was discontinued. It gave no further trouble until October, 1913, when the eye became red and painful. About January 1, 1914, she noticed a small black spot at the outer margin of the cornea, in the horizontal meridian, which began to grow quite rapidly, and progressed in size until the case came under my observation.

On inspection the right eye appeared normal; the left presented a small black tumorous mass, situated between the insertion of the external rectus muscle and the corneal margin. There was a triangular area of slight pigmentation in the conjunctiva, the base of which coincided with the margin of the tumor, the apex extending upward and outward.

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[1] Read before the Section on Ophthalmology of the N. Y. Acad. of Med., May 18, 1914.

There was no evidence of old trachoma present. The tumor proper measured about 8*mm* in its horizontal, and about 5*mm* in its vertical, diameter. It was slightly constricted at its base. The superficial layers of the cornea appeared to be slightly elevated where the tumor encroached upon it. The attached portion of the tumor seemed to adhere closely to the limbus and adjacent episcleral tissues. The portion of the tumor external to the constriction was removed for pathological examination. The condition of the eye at this time, aside from the tumor, was as follows: Cornea and aqueous chamber normal; lens beginning cataractous; floating opacities in vitreous; the fundus, however, could be distinctly seen and appeared normal; vision with correction was $\frac{20}{30}$; transillumination clear except over insertion of external rectus muscle, in which no light penetrated the globe. Pupil reacted both to light and to accommodation. There was a slight contraction in the upper nasal field.

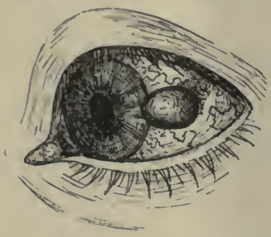
FIG. 1.—Pen Sketch showing location of tumor.

Examination of the tumor under the microscope showed it to be a mixed-celled melanotic sarcoma. The patient was informed as to the nature of the growth, and advised to have the eye removed at once, to prevent further extension. She reluctantly consented. The eye was enucleated on the 17th of April, the triangular area of conjunctival pigmentation being removed with it. The process of hardening the eye was at once begun, and the mounted sections, here presented, reveal the nature and extent of the growth.

Section of the Eye: The cornea is normal throughout, except at one limbus, where is a local swelling of the corneal epithelial layer, which also shows considerable breaking up of the cellular layer. There are several circular bodies which are made up of corneal epithelial cells.

Bowman's membrane is broken through by the tumor cells, where they are extending into the stroma layer. There is considerable swelling of the bulbar conjunctiva and Tenon's capsule, and some cellular invasion extending back on to the sclera. The new-tissue formation is almost entirely composed of cells having little or no intercellular substance, with quite a little pigment formation.

ILLUSTRATING DR. CRIGLER'S ARTICLE ON EPIBULBAR SARCOMA, WITH MICROSCOPIC AND MACROSCOPIC SECTIONS

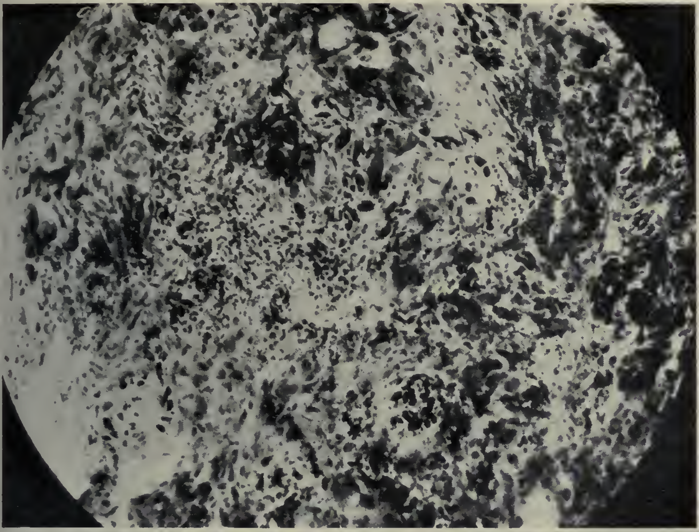

FIG. 2.—Greatly enlarged section of tumor showing marked pigmentation.

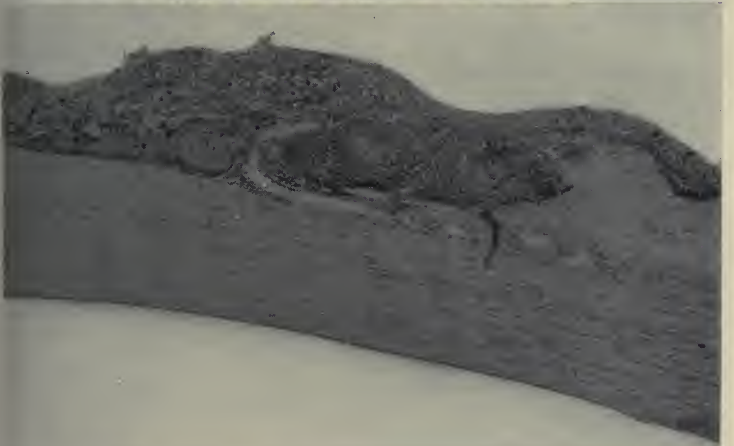

FIG. 3.—Horizontal section of eye through tumor. Magnification 35 diameters.

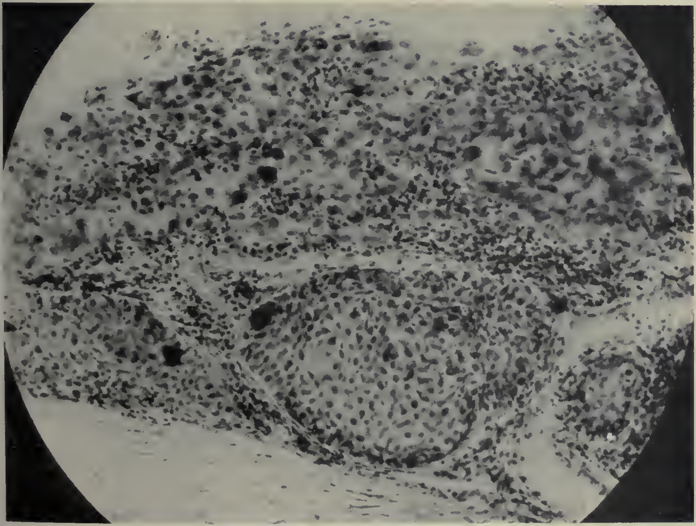

FIG. 4.—Same as Fig. 3. Magnified to 125 diameters.

The sarcoma cells are rather few over the position of the primary tumor growth. There are a great many round cells in this position. It would seem that the first operation removed the tumor formation almost entirely.

THE TUMOR.

The Capsule: The outer two-thirds of the tumor is partially encapsulated by the remnants of corneal epithelial cells and conjunctival tissue.

The Blood-Vessels: There are a number of small blood-vessels within complete vessel walls. There is considerable free hemorrhage into the tumor growth.

The Pigment: There is considerable free granular and cellular pigment formation. This is undoubtedly autochthonous in its origin and not from the hemorrhage.

The Cells: There are a great number of large round sarcoma cells and a number of these cells show double nuclei. There are also many large spindle cells throughout the growth. A rapid cell division is taking place, showing many small round sarcomata cells. This growth should be considered as a mixed cellular one, *i. e.*, large and small round and spindle, with quite a high degree of pigmentation.

Diagnosis: Melanotic epibulbar sarcoma.

In reviewing the literature on the subject, one is at once impressed with the rarity of such tumors.

Verhoeff and Loring, in 1903, made an exhaustive study of this subject, and their report up to that time embraced practically all of the cases that had been previously reported.

"Holmes was reported to have found, in 1878, three cases of sarcoma of the conjunctiva among 20,000 eye cases; Adamuck, three in 16,000; and Verhoeff and Loring themselves, at the Massachusetts Charitable Eye and Ear Infirmary, two epibulbar sarcomata in 44,719 eye cases."

My own examination of the records of the Manhattan Eye, Ear, and Throat Hospital reveals only four epibulbar sarcomata out of a total of 100 tumors of the conjunctiva, the number of other conjunctival affections being over 100,000.

The tendency of these tumors is not to penetrate the globe, but to recur locally when removed, and to produce metastases when not dealt with in a radical manner.

Of the 73 reported cases, examined by Verhoeff and Loring, in 1903, only five showed intraocular involvement. Of the 12 more recently reported cases examined by myself since then, none showed intraocular involvement; when this does occur, it is along the perforating anterior ciliary vessels. The cornea is practically immune to the development of sarcomata, although Rumschewitch and Semple and Villard report two involving the cornea alone. The exposed portion of the limbus is, as a rule, the site of development of these tumors, more often at the outer margin of the cornea. It is here that one often observes a dark pigmentation, especially in brunettes. In a certain percentage of cases, these tumors originate in this pigmented substance. Traumatism and prolonged irritation are thought to act as exciting factors in the cell proliferation.

The majority of cases occur in persons of advanced years, although Fromagat reports a case of embryological development, which revealed a distinct tumor formation at the third month of life, but showed no proliferation until the fifth year. These tumors are, as a rule, melanotic, the ratio of pigmented to non-pigmented being about as 6 to 1.

The statistics of Verhoeff and Loring are very convincing, and prove beyond doubt that epibulbar sarcomata should be dealt with as radically as sarcomata in any other part of the body. In substantiation of this claim the following statistics are given:

Of the 73 published cases, 53 were treated by primary abscission.

No recurrence after six months' observation	1	
" " " one year's "	4	
" " " two years' "	1	
" " " several years' "	2	8
Recurrences within one year's "	10	
" " two years' "	3	
" " several years' "	4	
" exact time not stated	19	36
Not followed after operation,		9

Among the above 36 cases in which recurrences were observed, the following bad results were noted:

1. Recurrence with preauricular gland. Death in four years from general metastases.
2. Within three years, enucleation, general metastases, and death.
3. Recurrence with preauricular gland in two and one half years; exenteration of orbit and death from supposed metastases.
4. Preauricular gland and invasion of interior of eye.
5. Recurrence in orbit and parotid region.
6. Metastatic tumors on cheek and later on body generally.
7. After several abscissions preauricular gland.
8. Finally enucleation followed by recurrence in lids and orbit.
9. Recurrence in lids and orbit; enucleation and exenteration.
10. Recurrence in lid from implantation.
11. Enucleation and recurrence.
12. Recurrence in lids and doubtful tumor in abdomen.

In reviewing the literature subsequent to the publishing of the above report, the writer has collected reports of twelve other cases, which are here briefly given:

1. La Fon—A man, 35 years of age, developed a red spot at vertical portion of limbus, slightly invading the cornea, but tissue of cornea remained normal. Removed, with rapid healing. Recurrence in 18 months; no further report.
2. Jessup—E. J. G., age 36. Sarcoma at limbus on temporal side. November 10th removed; examination showed spindle-cell sarcoma. November 17th, recurrence in situ. Thought might have come from mole.
3. Benson and Mooney—Patient, age 40; tumor at limbus, temporal side, left eye; black, size of split pea. Removed and surface cauterized. Pathological report: small spindle-cell sarcoma.
4. Tweedy—Sarcoma of conjunctiva size of pinhead. Remained stationary for twenty years; removed, and within six months it recurred. Orbit exenterated, followed by metastases, and death in two years.
5. Ray—Voluminous sarcoma of the bulbar palpebral conjunctiva: Child, 6 years old; large tumor springing from upper portion of limbus of right eye; non-pigmented. Microscopic examination showed round-cell sarcoma. Growth rapid; orbit exenterated. No recurrence after ten months.

6. Schwenk—Case Edna N., age 15. Red spot on right eyeball, several years, 4*mm* to outer side of limbus; removed; recovery; no recurrence; specimen examined showed small round-cell sarcoma.

7. Lauber—Diffuse melanotic sarcoma of conjunctiva. Man, iron worker, age 44, got hot metal in eye; black specks followed and slowly increased. Examination showed whole of conjunctiva of lids and ball one black mass; interior of eye normal. Orbit exenterated; recovery; no further history given.

8. Veasey—W. B., age 47; small brown spot, temporal side of corneo-scleral junction, for twelve years; never given trouble until recently, then grew rapidly for seven weeks. Enucleation; no recurrence up to date—one year.

9. Sharp—Colored girl, age 8. Tumor left eye, pedunculated; removed; examined and pronounced sarcoma; no recurrence after four years.

10. Bell—Tumor at outer limbus of left eye, noticed by patient as small black spot six years ago. At time of examination, it measured 6*mm* wide, 10*mm* long, and was elevated about 3*mm* above the surface of the eyeball. Paralysis of external rectus muscle. Enucleated; examination showed it to be an alveolar melanotic sarcoma. No recurrence after one year.

11. Gruening—Small black tumor removed from outer side of left cornea. Two removals with two recurrences; enucleation; recurrence in scar in three months. Scar excised; recurrence in four weeks. Exenteration; no recurrence up to time of report.

12. Semple and Villard—Sarcoma Primitiva della Cornea. Patient, age 65; right eye red, and painful for several years; associated with pannus. Epithelioma lower lip; removed; noticed small red excrescence on right cornea several weeks previously. Examination revealed this growth on the cornea near the limbus, but independent of it.

Symptoms relieved by treatment and patient not seen for four years, when the eye became inflamed and painful again. Cauterization of the growth was followed by recurrence, three times in succession. It now extended over entire cornea. Patient lost track of, while tumor continued to grow slowly, but did not encroach on the conjunctiva.

Eye removed; no recurrence. Examination of the eye showed no pathological disturbance outside of the cornea. The superficial layers of the cornea were intensely infiltrated in places down to Descemet's membrane. The tissue formation was that of a non-pigmented plexiform fibrosarcoma. No local recurrence of the affection after fifteen months, but a recurrence of the epithelioma of the lower lip, followed by a second removal, with extension, and involvement of the preauricular glands.

It will be seen that the results in these cases substantiate the opinions already expressed: that sarcoma situated on the conjunctiva are essentially as malignant as those situated upon any other exposed surface of the body. That they are not as fatal, can be easily explained by the fact that they are discovered in their incipiency, are situated over the highly resistent sclera, and in close proximity to the non-vascular cornea, so that drainage from the tumor takes place in only one direction.

It should here be briefly stated, that small pigmented tumors, situated wholly within the conjunctiva, and freely movable, showing no tendency to cell proliferation, should not be classified as sarcomata, and hence not dealt with in so radical a manner.

The writer is indebted to Dr. A. Braun for the pen sketch, to Dr. George S. Dixon for the microphotographs, and to Dr. W. B. Weidler for the microscopical reports.

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REPORT OF TWO CASES SHOWING THE EFFECT OF SYPHILIS ON INJURY OF THE EYE.

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FOR years we have all more or less recognized the action of syphilis in injuries to other parts of the body, but my attention has recently been called to its effect in injuries of the eye, having two cases in which it was not diagnosed at the time of the injury, and which showed in a very marked way that it is one of the causes of trouble frequently overlooked.

Case 1.—American, aged 25; referred to me on November 25, 1912, from one of the mining camps in Arizona, giving the following history: First noticed trouble with the right eye twelve days ago; had some rock thrown in the eye while working, and shortly after noticed pain; was examined by the local doctor, who could find nothing in the eye to account for the trouble; pain continued, and on the fifth day the physician removed a small piece of rock from the right eye. The pain continued, the eye became very much inflamed, the pain increasing up to the time he came to me, being unable for the last few nights to sleep. Examination of the eye showed marked congestion over the bulbar conjunctiva; ciliary injection; cornea slightly cloudy; pupil slightly dilated, presumably by atropine. In the anterior chamber there was a hypopyon, starting from the nasal side at the angle of the anterior chamber, extending to mid-pupillary distance, being surrounded at its extremity by a very thin membrane, which extended about two millimeters farther in each direction. All of it slightly gray in color. The hypopyon was almond-shaped, well-rounded surface above, apparently slightly flattened on the iris side. Below this, about halfway between the origin of the hypopyon and the lower median line, at mid-distance between the root of the iris and the pupillary edge, were two small reddish-yellow, slightly elevated spots, about two millimeters in diameter; keratitis punctata on the posterior corneal surface. He gave a history of always having been in good health; no cough; operation for hemorrhoids four or five months ago; chancroid infection six months ago, which was treated by a reputable physician, who at the time told him there was no possibility of luetic infection; never had a sore throat; does not remember ever having an eruption. A tentative diagnosis of papular syphilide was made, which was confirmed by a positive Wassermann. On November 26th, he was started on hypodermic injections of $\frac{1}{4}$ gr. of succinimide of mercury and instillations of atropine; this treatment being continued for ten days. On the third day the pain had decreased in the eye; on the fourth day, the pain was entirely absent and the hypopyon was markedly shrunken; on the eighth day the hypopyon had entirely disappeared, with the exception of a small particle, which had dropped off the tip into the bottom of the anterior chamber; the pupil dilated; the vision was markedly improved. At the root of the iris could be seen a slight elevation, undoubtedly a large papular syphilide, which was the source of the hypopyon. The two small papular syphilides had entirely disappeared; pupil dilated regularly, and no synechia. He was referred back to the general physician for further treatment for his constitutional trouble.

This case was important, first, from the medico-legal aspect. The injury which he claimed, having been received in the course of his work, might have been the cause of a suit for damage. It is interesting from another standpoint, as Fuchs says that papular syphilides never occur in the mid-region between the root of the iris and the pupillary margin, always occurring in one of the two latter places. He also makes the statement that they never break down or suppurate, which was noticeable in this case.

Case 2.—Mexican, aged 60; referred to the Charity Eye Clinic, with senile cataract in both eyes, giving previous history of fairly good health, but claiming an attack of pain in the back of his neck, seemed to think with loss of consciousness, which, in a patient of this type, may mean almost anything. The case was an extremely hard one to operate, the patient being unable to move his eyes in the direction required. He was trained three times a week for two months, never in that time acquiring the ability to look down on direction. The eyes were deeply sunken in their orbits; the cataract knife being placed across the eye from the lateral orbital rim did not touch the cornea. He was operated March 1, 1913, the cataractous lens successfully removed, the iris replaced, and up to the tenth day the eye was apparently doing nicely. On the twelfth day after the operation, there developed iridocyclitis, which we were unable to control with ordinary remedies. The eye grew steadily worse, the pupil became fixed and filled with an exudate, hemorrhage in the anterior chamber, the patient during all this time suffering severe pain. On March 24th, having failed in other means of diagnosis, a Wassermann was done, which was positive. He was immediately given a full dose of salvarsan, which relieved the pain within two days, with complete absorption of the blood and exudate within ten days, but left the pupil completely drawn up toward the corneal wound and occluded. Anti-syphilitic treatment of mercury and iodide of potassium was continued for four or five months, when an operation was done and an artificial pupil made, giving him vision enough to move about without difficulty. He was under treatment for a year and a half, when a Wassermann was done; being found negative, his right eye was operated on with complete success.

To the physicians in this part of the country, who are doing charity work among the poor class of Mexicans, this case is significant, as we have always felt that lues was liable to complicate any trouble they might have. Since that time I have added the Wassermann examination to the other tests before operating for cataract on people of this class. An interesting feature in connection with cases of this kind is a report I have had made through the kindness of Dr. Paul Gallagher, of the Medical Clinic, and Dr. Willis W. Waite, of the Crouse Laboratories. Blood was taken from fifty indiscriminate clinical cases, all Mexican, only one of whom showed a typical lesion. Nine others were suspected, possibly more because of their race and social standing than for any clinical reason. I herewith attach report, showing the sex and age of those examined, with the percentage of positives:

Male.			Female.		
Age.	No. Examined.	%	Age.	No. Examined.	%
Under 20	1	100%	Under 20	4	50%
20–30	8	50%	20–30	14	79%
30–40	3	66%	30–40	5	40%
Over 40	8	75%	Over 40	7	70%
Total and Average	20	65%	Total and Average	30	66%

While the number examined is not sufficient to prove conclusively that the percentage of positives remains constantly uniform, it is sufficiently large to show that the question of syphilitic infection may be a source of a great deal of trouble and complication in injuries to the eye of this class of people. A significant fact in the percentage column is that of 20 males 65 % were positive; in 30 females, 66 % were positive.

ON DECOMPRESSION OPERATIONS IN DISEASES OF THE OPTIC NERVES.

By Prof. A. BEDNARSKI.

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Translated from *Archiv f. Augenheilkunde*, Vol. LXXII., 1912.

DURING the past year I had the opportunity of suggesting a decompression operation in six children from my service in the Sophien-Spital. In five of these the callosal puncture after Anton-Bramann was performed; in one, in addition, a trephining and in another a number of lumbar punctures.

CASE I.—S. D., 6 years old, states that her sight has been failing for one year. On March 24, 1911, the right eye could perceive hand movements, the left saw fingers in 3½*m.* The pupils are moderately dilated, of the same size, react promptly to light. The frontal and parietal sutures are thickened and distended. The coronary suture is somewhat depressed. The skull is short, high, asymmetrical, and presents a low degree of oxycephalia. The frontal eminences are approximated to one another. The region of the greater fontanelle is bulging. The orbital cavities are deeper than normally. The teeth show rachitic changes. The optic disks are unusually pale, right more than left, with sharply defined margins. The retinal arteries are narrow.

Diagnosis: Rotatory nystagmus, divergent strabismus, post-neuritic optic atrophy with oxycephalia.

On April 7, 1911, the callosal puncture was performed by Professor Schramm. A little blood-stained fluid was obtained. April 10th, the right eye could count fingers. April 14th, the right eye, fingers in ½*m*; left eye, fingers in 3½*m.* The child is livelier and has a more friendly expression than before the operation. April 28th, right, fingers, ½*m*; left, fingers, 5*m*. The visual field has contracted, the wound in the skull is cicatrized, and no defect in the bone can be palpated. The subsequent course is uneventful. The improvement in vision persisted during the entire period of observation, which was six months. October 20, 1911, right, fingers, ½*m*; left, fingers, in 5*m*. The visual field is very much contracted.

Without wishing to discuss the cause of optic atrophy in defects of the cranium, I would like to correct the statement of Uhthoff who mentions me among the authors that regard a basal meningitis as the cause of an optic atrophy. In 1908 I published a number of cases of asymmetry of the skull with optic atrophy, and emphasized the internal hydrocephalus as the cause for the optic-nerve condition. In Nagel's Annual Report my paper is abstracted as follows: "The author believes that the atrophy of the optic nerves developed from the internal hydrocephalus (the serous meningitis) though in some cases a simple chronic meningitis may have caused the atrophy."

Formerly these cases were treated with medicines. The prognosis in the least marked of these cases was consequently doubtful. In this case which has just been described, blindness would probably have resulted after the course of a few years. The positive result of the operation shows that the cause for the neuritic atrophy of the optic nerve is to be found in the increase of the intracranial pressure. In this case, notwithstanding the advanced atrophy with decided reduction of the vision, sight improved immediately after operation, in the right eye to fingers in ½*m*, and in the left eye to fingers in 5*m*, and this improvement remained during the period of observation.

Similarly operated upon cases have only occasionally been reported in literature. In 1908 Dorfmann reported a case of trephining in a girl four years of age, with a tower skull and choked disk. The child suffered from severe headache. Three weeks later the vision had improved in the right eye from $\frac{3}{30}$ to $\frac{6}{20}$; in the left eye from $\frac{6}{60}$ to $\frac{6}{24}$. The prominence of the disks was reduced by 1 D.

In 1909 Anton published a case of a man 30 years of age, with a tower skull, in whom the callosal puncture had been performed. The sight improved in the right eye from $\frac{1}{3}$ to $\frac{2}{3}$; in the left eye there was no improvement. Headache and attacks of vertigo disappeared.

In recent years Meltzer, Falta, Natanson, Vorschutz, Bullinger, and others have reported favorable results after operations in these cases (craniectomy, trephining, ventricular puncture, callosal puncture, lumbar puncture).

CASE 2.—M. K., 9 years old, suffered last year from illness with fever, headache, and vomiting. The headache continued, especially on the left side. Sight has become affected for four weeks and patient is entirely blind for the last week. There is involuntary evacuation of feces.

On examination the right eye cannot be closed. Both eyes are turned somewhat toward the left. Movements of the eyes to the right are restricted, especially the right eye. The pupils are dilated, left more than right, and do not react to light. No p. l. Bilateral choked disk, elevation of 3 to 4 D.

Physical examination showed general pallor, scoliosis, and enlargement of the inframaxillary lymph glands. Urine normal, Pirquet positive.. Some indication of a right facial paralysis. Cracked-pot sound on percussion of the skull. The left corneal reflex abolished, the right is weak. The tongue is deviated to the left. Slight rigidity of neck; no ataxia. General tremor on standing. Reflexes normal.

Diagnosis: Bilateral choked disk, paralysis of right facial nerve, suggest a brain tumor, probably a tuberculous growth.

April 14, 1911, a decompressive trephining was performed. An oval piece of bone was removed on the right side of the skull; the dura was not opened.

April 21st. No improvement.

April 24th. Convulsions with coma.

April 25th. Vertigo.

May 1st. Convulsions have repeated themselves every day.

May 2d. Callosal puncture. The dura was also exposed by the same cutaneous incision. 1 to 1½*ccm* clear blood-stained fluid was evacuated and the dura was then sutured.

May 6th. No further convulsion.

May 11th. The swelling of the disks has diminished.

May 12th. Paralysis of the left upper extremity.

May 16th. Cerebral prolapse.

June 17th. Death. Autopsy report: Conglomerate tubercle of the right half of the cerebellum, with circumscribed encephalomalacia. Chronic internal hydrocephalus. Tuberculous adenitis. Pleurisy. Tubercular changes in the kidney, intestines, vertebral column. The growth of the cerebellum was the size of a hen's egg.

In this case trephining did not improve the condition of the patient. On the contrary, convulsions and vertigo set in. These were relieved by the puncture but the symptoms associated with the brain tumor became more pronounced.

Case 3.—S. B., 11 months old. The patient does not see. The head is distinctly that of a hydrocephalus. It measures 46½*cm*, with distended cranial bones, large fontanels, and separated sutures. The large fontanel measures 6*cm* in diameter. The pupils are large and do not react. The eye grounds are normal.

Diagnosis: Amblyopia; congenital chronic hydrocephalus.

March 1st and 4th two lumbar punctures were performed without any result, as only blood was aspirated.

A callosal puncture was to have been undertaken, but the child left the hospital. It returned in May with the same symptoms and the head has even become larger. A general examination shows no distinct rachitic symptoms. There is no rigidity of neck. The child is now 14 months old and cannot stand on its legs, cannot sit up nor support its head. Pulse rate 88. On passive motion there is some rigidity of the knee joints. Knee jerks active and the large toe is antiflexed. Ankle clonus distinct.

Callosal puncture was performed May 13th. As the bones are very thin, the oval opening was cut out with the scissors. May 15th the child is bright and directs its eyes toward objects which are held before him, and is interested in everything that is going on. The pupils react to light. There is no change in the general condition. The improvement in sight persisted for only two weeks.

February 10, 1912. A relative of the child reports that the child is alive, intelligent, healthy, is able to talk and sing, but cannot walk nor sit up nor support its head. The child is able to see somewhat, for it fixes with its eyes and aims to grasp objects which are held before it.

It is possible to obtain a permanent improvement in these severe cases, unless the patient has a bad heredity. This is proven by the case reported by Starck in the *Münch. med. Wochenschr.*, 1909, page 105, of which the following is an abstract:

M. B. at the beginning of its second year was ill with fever for several weeks, with severe meningeal symptoms. The head became very large. She could not see nor could she raise herself. Eight months later the patient was admitted to the Children's Hospital, where it was found that she was well nourished, of normal size. The asymmetrical skull was enormous, measuring 51*cm.* The frontal bosses prominent, the parietal bone bulging, the head very heavy. The patient is generally in a good mood, lies quietly on her back. The arms and legs can be moved, but cannot sit or stand or support its head. It is difficult to determine whether the patient hears or sees. The pupils are dilated. She does not fix. The optic nerves are somewhat pale. *Diagnosis:* As there is no optic-nerve atrophy, the blindness is presumed to be cerebral. The patient does not talk; no spasms; knee jerks accentuated; eats well. The spinal fluid on lumbar puncture shows increased pressure. It is clear and contains a few lymphocytes. This puncture was repeated ten times and was well borne by the child. On the following day, or after two or three days, there was a rise in temperature up to 40° C. after the puncture. After the fourth puncture there was distinct improvement in vision. Bright objects were followed by the eyes. Two years later the child can hardly be recognized, though the head is still very large, 53.5*cm* in circumference, with the chest measurement of 47; but the child is able to sit up, looks around in an animated way, talks a great deal, and seems mentally normal. According to Starck, the lumbar punctures were here of avail because the condition was one of a secondary hydrocephalus following an acute cerebral inflammation.

CASE 4.—S. P., 4 months old, has lost his sight for four weeks. The parents were related. The mother states that the first child was lost through a miscarriage, the second was born dead, and the third is healthy. The eyes are usually directed downward, oscillate, and perform slow rotations. The left pupil is larger than the right. There is no reaction to light. Eye grounds normal. The circumference of the head is 41.3*cm*, chest circumference 38*cm.* The large fontanel is 2¼*cm* broad. Knee jerks normal.

Diagnosis: Amaurosis, rotary nystagmus, congenital internal chronic hydrocephalus.

After the first lumbar puncture there was no improvement. After the second, the eyes are not directed down as much and the motion of the eye is less. Pupils uniform. The child does not see. The optic disks are somewhat paler.

November 11, 1911, the patient has had ten inunctions with mercurial ointment. The child is now 10 months and is well developed. The large fontanel is raised when the child cries, otherwise it is somewhat depressed. The head circumference is 44.5*cm*. The child is able to stand and sit up. The pupils are uniform and the eyes are quiet. The optic disks are sharply defined, though somewhat paler.

May 16, 1912. The child keeps its eyes pressed together and does not fix. Divergent strabismus. Occasional nystagmus. No reaction to light. The general examination showed signs of rickets; the orbital glands are enlarged. The large fontanel is very small, about 1*cm* in diameter. The head circumference is 45*cm*, the chest measures 43.5. Chvostek negative. The pulse rate is 100. No rigidity of knee or joints. It is not possible to determine the presence of knee or ankle reflexes. The child is happy and plays. The Pirquet and Wassermann reactions are negative.

May 31st. The callosal puncture is performed and a clear fluid evacuated under considerable pressure.

June 1st, the child does not see. The oscillations of the eye have increased.

June 7th, no return of sight. The eyes, however, are kept open better. The right eye is deviated outward, the left is directed upwards. No nystagmus.

July 4th, no change.

September 29th, the general condition of the child is good. There is no nystagmus, though the child turns its eyes about like a blind person. Pupils are moderately dilated and do not react. The disks are pale.

This is probably a complicated case. The obvious history suggests syphilis. The relationship of the parents speaks for the congenital cause of the amblyopia. The disturbances of position and motility of the eyes suggested increased intracranial pressure and decided me to suggest an operation, as lumbar puncture did not produce any improvement. At operation the cerebral and spinal fluid escaped under pressure and after the operation there was an improvement in the position of the eyes. This is probably a case of congenital amblyopia.

Case 5.—S. R., 8 years old. Her father died from tuberculosis. In September, 1910, the child was taken ill with severe headache which continued until May, 1911, and was frequently accompanied by vomiting. Numerous skin abscesses developed. During the winter of 1911 the child was treated for gastritis, and a physician recognized meningeal symptoms. May, 1911, the headache diminished but the sight began to fail.

June 16, 1911, the pupils are moderately dilated, uniform, react promptly. Alternating divergent strabismus. Corneal reflex preserved. Right eye $\frac{5}{30}$—$\frac{5}{20}$; left counts fingers. The field of the right eye is contracted to 15° up, down, and in; 35° out. The disks are unusually pale and not defined, the retinal vessels somewhat narrow. There are no signs of choking.

The general condition of the child shows that she has suffered from rickets. There are enlarged glands in the neck and scars in the right hand; the head is enlarged to 52.5*cm;* the chest measures 58.5*cm.* The skull is of rachitic shape with dilated frontal veins. A cracked-pot sound is elicited on percussion over the left side of the skull. The right nasolabial fold is not pronounced; the right upper extremity shows exaggerated reflexes. Knee jerks normal. Babinski negative; Chvostek positive but weak. Abdominal reflex on the right side stronger than on the left. No fever. Pirquet positive; Wassermann negative.

Diagnosis: Neuritic optic atrophy, acquired internal hydrocephalus.

Though the sight has failed for only a few weeks, the fundus examination shows that an inflammation of the optic nerves must have existed for a long time. The general condition of the child is good and a decompression operation is recommended only on account of the diminution in sight.

June 24, 1911, the callosal puncture was attempted. On incising the dura there was so copious a hemorrhage that the operation had to be postponed.

June 30th the patient complains of vertigo and vomits. July 28th no improvement in sight. July 29th, the callosal puncture was attempted on the other side, with success.

August 2d, left counts fingers at 1*m.*

August 8th, right $\frac{5}{15}$, left fingers 1½*m.* The fields are unchanged. On percussing the skull, a similar note is elicited in all places. The nasolabial folds are equally marked.

September 19th. The patient no longer suffers from headache and has not vomited. She is much quieter and seems normal. Vision, right eye, $\frac{5}{15}$ to $\frac{5}{10}$; left, fingers at 4*m.* The disks are very pale; the margins are undefined; there is no œdema and no inflammatory symptoms. There is, in other words, no change in the ophthalmoscopic picture, The field is enlarged in both eyes. Right 30° up, 35° down. 70° out, 60° in. Left 25° up, 30° below, 40° out, and 20° in.

This is a case of acquired hydrocephalus following a meningeal process. The vision improved after operation from

$\frac{5}{30}$ to $\frac{5}{15}$ in the right eye; in the left eye from movements of hand to counting fingers to 4*m*, notwithstanding that the optic atrophy was pronounced in both eyes. The headache disappeared.

Similar cases have been reported by Bramann, Orzechowski, and Rydygier, Jr. (callosal puncture), Halben (Payer's operation), Dubarry and Guillot, Velter and Chauvet (decompressive trephining), and others.

In the case of Bramann, a tuberculous child, aged 7, with progressive hydrocephalus, circumference 54½*cm*, progressive cerebral ataxia, choked disk, reflex iridoplegia, was operated upon by callosal puncture and two weeks later a diminution of the choked disk could be observed. Four months later vision had improved to $\frac{5}{7.5}$. The optic nerves showed a moderate degree of atrophy after choked disk.

Bramann recommends callosal puncture in all cases of hydrocephalus which do not respond to internal treatment and have not been improved by the simpler methods of operation on the ventricles and lumbar puncture. He performed callosal puncture in eight cases of hydrocephalus. In brain tumor the autopsy showed six and seven months after the operation that the opening in the corpus callosum had remained patent. Bramann has abandoned lumbar puncture in brain tumor on account of the accidents which have been observed.

Halben observed a girl of 16 years with paresis of the left abducent nerve, bilateral choked disk measuring 2*mm*. Vision, right ½; left 1. Field normal. The diagnosis was idiopathic chronic internal hydrocephalus. The puncture of the ventricles and of the spinal canals produced a transient reduction in pressure with recovery of the abducent and optic nerves. Recovery took place after Payer's operation. All symptoms were relieved, especially the abducent paralysis, nystagmus, choked disk, diminution of vision, headache, and tremor. The relief of these symptoms was regarded as due to the permanent reduction of the increased intraventricular pressure through the new-formed passages.

CASE 6.—E. L., aged 5, was taken ill eight weeks ago with convulsions, fever, and a right hemiparesis. The eyes were always directed down and the head drooped. On examination the eyes are directed down so that the pupils are covered by the lower lids. There is no movement upward. The eye grounds are negative. The child apparently does not see. The head measures 44.5 and the chest 35*cm*. The sutures are open, the sagittal sutures to the extent of a finger, the coronary as much as a half finger broad. The large fontanel measures about the size of the flat of the hand. The occipital bones are like parchment. The veins are dilated. Chvostek negative. The right upper extremity is weak. The right knee joint is swollen and contracted. Babinski negative. Pirquet negative.

October 28, 1911. Lumbar puncture. About 14*cm* clear fluid evacuated.

October 29, 1911. The child is happy and smiles. The eyes are not turned down so much. There is no sight.

October 31st. The eyes are in normal position and can move upward. No vision. The large fontanel is depressed. The head circumference has diminished 1*cm*. The child is better able to hold its head. The retinal veins in the right eye which previously were congested are less dilated.

November 4th. The child again is holding its eyes turned down. Lumbar puncture withdrew 15*cc* of cerebrospinal fluid which contained sugar.

November 6th. No improvement. Head measures 45*cm*.

November 8th. 25*cc* are evacuated by lumbar puncture.

November 12th. No improvement. Head measures 45.5*cm*. A callosal puncture was then to be undertaken, but the mother took the child out of the hospital.

This is a congenital rapidly progressing hydrocephalus. The eyes are turned down. There is amblyopia without ophthalmoscopic changes. After the first lumbar puncture there was an improvement in the general condition and in the position of the eyes. Additional punctures were without result.

These cases show that the callosal puncture operation has not produced a single complication, on the contrary the following day the children were always decidedly brighter. There never has been a rise in temperature. Central vision improved a few days after the operation (in Case 1 after three days, in Case 3 after two days, in Case 5 after four days). The visual field was enlarged in Case 5 six weeks after the operation (11 days after the operation there was no improvement).

Cases 1 and 5 demonstrate that even in advanced optic atrophy the callosal puncture can improve and is to be recommended.

The above described cases illustrate four diseased conditions in which decompression operations are indicated, namely: (a) acquired hydrocephalus; (b) oxycephalus; (c) congenital hydrocephalus; (d) tumor of the brain. The best and most permanent results were observed in the acquired hydrocephalus. The value of an operation in oxycephalus cannot be determined at the present time; our experiences are too small, though recent observations seem to favor operation. In congenital hydrocephalus the result depends upon the kind of case. In severe cases the children usually die. If they continue to live the mental development does not progress satisfactorily. The slight cases, on the other hand, get well and the children develop intellectually in a normal manner. It is well known that there must be a communication between the ventricles and the subdural space with physiologically normal intracranial pressure, in order to supply normal nutrition and normal function for the brain. Continued increased intracranial pressure must have a deleterious effect upon the sight and the intellectual development of the child, and should be relieved by decompression operation.

The prognosis in brain tumor is individual and depends greatly upon the nature of the tumor and the time at which an operation is undertaken. It is above all necessary that an operation should be undertaken before vision is very much reduced. Visual disturbances are not at all uncommon following cerebral diseases in childhood, as is well known, and in some statistics on the causes of blindness in childhood, which I published (*Archives d'Ophtalm.*, 1911), 9% of the cases of blindness were the result of cerebral affections. In the outpatient Eye Department of the Sophien-Spital in six thousand patients (1904–1911) there were 32 cases of optic-nerve disease following cerebral affections. Deducting from this number 2 cases of brain tumor (in both of which there was choked disk), the causes in the remaining 30 cases were inflammation of the brain, of the meninges, and hydrocephalus. The ophthalmoscopic examination gave the following results:

Atrophia simpl	7 cases
" post neuritidem	10 "
Amblyopia	8 "
Neuritis n. opt.	2 "
Atrophia	3 "
	30 cases

During this period in 5 additional cases atrophy of the optic nerves was discovered, presumably of congenital origin (in three of these retinitis pigmentosa was also present); furthermore 4 cases of optic-nerve affections after infectious diseases, 1 case of atrophy after scarlet fever, 1 case of amblyopia after an exanthem, 1 case of blindness after scarlet fever, 1 case of atrophy of the optic nerve and of the retina after an uncertain infectious disease. Furthermore, there were 17 cases of atrophy of the optic nerve, amblyopia without cause, and 1 case of optic neuritis following subcutaneous injection of salvarsan in interstitial keratitis. These statistics show that in children cerebral affections are the most important cause for diseases of the optic nerves, as in 59 cases there were 30 where a disease of the optic nerve was associated with the above-mentioned cerebral affections, excluding the 2 cases of brain tumor, about 50%. It is probable that this percentage is too low.

CLINICAL OBSERVATIONS ON IDIOPATHIC IRIDOCYCLITIS AND SYMPATHETIC OPHTHALMIA.

(A CONTRIBUTION TO ELSCHNIG'S THEORY OF SYMPATHETIC OPHTHALMIA.)

BY WALTER BROCK, M.D., STUTTGART.

Translated by ALFRED BRAUN, M.D., New York.

ELSCHNIG sums up some exhaustive serological experiments, undertaken for the purpose of clearing up the much debated subject of sympathetic ophthalmia, as follows:

1. "I contend that there occurs in the eye a resorption of antigens in antigenous form, that, under certain influences, as during subconjunctival injections, an increase in the antigenous effect occurs, and under other circumstances, as in acute suppuration, a lessening of the antigenous effect of the substance introduced into the eye occurs. This fact was fully confirmed by Krusius and Kümmel by means of the most delicate method of anaphylaxis."

2. "I could prove that uveal emulsion (uvea and pigment-epithelium) introduced into the body of an animal had an antigenous effect. The active ingredient is probably the pigment."

Through these observations, the author arrived at the theory of the occurrence of sympathetic ophthalmia as the result of the oversensitiveness of the uvea, resulting from antigenous resorption of uveal tissue from the eye first diseased.

From a large clinical material and a study of the pathological anatomy of sympathetic ophthalmia during the past few years, Elschnig tries to prove the correctness of his hypothesis.

The present work is parallel to Elschnig's clinical studies, and will not consider the subject from a pathologic-anatomical standpoint. However, it should be noted that Reis has called attention to the difficulties that stand in the way of Elschnig's theory of sympathetic inflammation from the pathologic-anatomical viewpoint.

Elschnig, through an examination of the causes of sympathetic ophthalmia and of the so-called idiopathic iridocyclitis or iritis, arrived at the conclusion, that there can be no real difference between idiopathic and sympathetic iritis, neither in regard to the involvement of both eyes, nor in regard to the course, nor the outcome of the disease; for

1. Non-traumatic iritis involves both eyes very frequently. According to Elschnig's as well as Schnabel's material, in the chronic inflammatory or insidious iritides, in the majority of cases there is either a simultaneous involvement of the other eye, or this follows after a longer or shorter interval.

2. The prognosis of idiopathic iritis is not so favorable as a comparison of the two forms of iritis might lead one to suppose.

3. Finally, sympathetic inflammation is by no means as malignant a disease as was heretofore supposed. Schirmer obtained cure in 14% of cases, and Gifford had even better results.

Elschnig believes to have found further support for his theory in the following two points:

First in anaphylaxis of the uvea, the judgment of which, as a purely serological problem does not fall within the scope of this work; and second, in the proof of a general constitutional anomaly, which manifests itself, in the cases of iridocyclitis which have no demonstrable etiology, in an increased excretion of indol.

From a number of cases examined by internists, this question is carefully gone over, and the demonstration of indol in the urine looked upon as an indicator of gastrointestinal disturbance.

E. v. Hippel doubts whether sympathetic ophthalmia can be wiped out as an independent disease, as it would then be necessary to recognize that spontaneous iridocyclitis could lead to sympathetic ophthalmia. Furthermore, the factors set forth by Elschnig, namely, anaphylaxis of the uvea and constitutional disease, occur very rarely, as in most cases it is in very healthy working people that a perforating eye injury is followed by a sympathetic inflammation in the other eye.

Furthermore, v. Hippel asks two questions, which interest us particularly from the standpoint of clinicians:

Does indicanuria occur as often in other clinics as in Prague, and does it not occur in other diseases of the eye?

And furthermore, has indican excretion the significance which Elschnig gives to it? v. Hippel had his material carefully gone over in regard to the first point, and came to the conclusion that in other eye diseases, neither more nor less frequently was there an increased indicanuria, than in idiopathic iridocyclitis.

This agrees with the examinations of Bernheimer, who states that the occurrence of an increased amount of indican in the urine has no special significance, according to his experience. For an increase of indican occurs in iridocyclitis as well as in retrobulbar neuritis, phlyctenular keratitis, senile cataract, and other eye diseases.

The second question v. Hippel answers by stating that, according to reliable investigators, indicanuria is a physiological occurrence.

Finally Stuelp made the statement, even before v. Hippel, that indicanuria can occasionally be considered to have an influence in eye diseases, but, according to his experience, we have no right, even in the presence of intestinal disturbances, to base an eye disease upon it alone, as long as every other etiologic possibility has not been excluded.

It seems therefore questionable, whether an increase of an organic combination, which varies in a normal bodily condition according to the intake of nourishment, can be assumed ever to be a pathological factor.

I can now turn to Reis's work, which attacks Elschnig's hypothesis from another side. He arrives, in harmony with other ophthalmologists, at the conclusion that spontaneous chronic uveitis occurs especially in anæmic young girls of tuberculous habit, whereas sympathetic ophthalmia occurs in healthy strong young men, and children, which agrees with the conclusions of Hippel, as well as the following experiences in Munich.

Furthermore, the course of the two diseases is too dissimilar to allow them to be considered identical. In sympathetic inflammation, the first outbreak decides the fate of both eyes, in most cases.

Along with several cures, with perfect or almost perfect vision, Reis reports nine cases, in which sympathetic ophthalmia caused blindness of both eyes in the first attack. Such an outcome was not observed by Reis in spontaneous iridocyclitis, even in the rapidly progressive cases of intrabulbar tuberculosis. Nor could he find any in the literature.

v. Hippel asks with right the question, why in spite of therapeutic intervention disease of the second eye in idiopathic iritis cannot be prevented, as according to Elschnig this is identical with sympathetic inflammation, and he has been able to prevent this latter through prophylactic internal treatment.

In conclusion let us look at Bach's statistics, who found in iritis and cyclitis, only in 15 to 20% of the cases, a double-sided involvement, and finds as the most common cause of the iritis tuberculosis and rheumatism; 70% of all cases of iritis get well, according to Bach.

I would like to state my position here, in connection with the following material, in regard to two points.

1. We also have, in agreement with Reis, a series of observations, where sympathetic inflammation could not be prevented in very healthy children, who received their eye injuries as the result of their extreme good health and liveliness.

2. Furthermore, it is also our experience that the first attack determines the entire further course of the disease in sympathetic ophthalmia. If some vision remains after the first attack, the later recurrences do not cause any appreciable diminution in the vision, whereas in spontaneous iridocyclitis the first attack rarely leads to blindness, while the succeeding attacks often do.

Scientific criticism, up to the present, has not been able to find a certain foundation for Elschnig's theories.

I turn now to the real subject-matter of my work, namely, the study of the clinical material, in the Munich University Eye Clinic, of iridocyclitis and sympathetic ophthalmia, from October 1, 1908, to May 31, 1912.

To state briefly the etiology of the cases to be detailed later, let me say that they agree with the common experience: *i. e.*, the most important etiologic factors among the cases which occurred in the last two years, which were examined with the modern diagnostic aids (Wassermann and Pirquet), were tuberculosis, syphilis, rheumatism, gonorrhea; less common causes were chronic gout, or acute infectious diseases, such as diphtheria, pneumonia, and influenza.

Among the less common causes of iritis were two cases of herpes iridis, and one case of severe iridocyclitis in juvenile vascular disease, as the anatomical examination of the enucleated eye showed.

Of the 186 cases, 114 were unilateral, and 72 bilateral.

Of the last mentioned, 43 were attacked bilaterally at the same time, or within a short interval, the remainder after a long interval.

It is of course impossible to say how many had an involvement of the second eye after they were lost track of.

On comparing the Munich and the Prague statistics, we see that the differences are very slight, but where differences occur they speak against Elschnig's assumption.

If we look at the differences between unilateral and bilateral disease, we see that Elschnig has 50% and we 61.3% unilateral, as against Elschnig's 50% and our 38.7% of bilateral diseases. The Munich statistics show 11.6% less than Elschnig's, of almost complete unilateral blindness, and 20% less of the bilaterally blind.

Of the unilateral diseased cases, Elschnig shows 48% cured, while we show 54.4%. We have 48.5% total of healed eyes, while Elschnig has 35.6%

These results appear in an entirely different light, if we compare the outcome of spontaneous iridocyclitis with that of sympathetic ophthalmia.

To compare idiopathic iridocyclitis with the sympathetic form, that is to consider the disease of the second eye in spontaneous iritis as a sympathetic ophthalmia (through anaphylaxis of the uvea), with Elschnig, meets with decided objections, because duplicity of inflammation forms the specific characteristic of sympathetic disease.

However, even according to Elschnig's statistics, spontaneous iridocyclitis occurs unilaterally in 50% of the cases; according to our statistics, in 61.3%; and according to Bach, in 70%.

And if Elschnig states that especially in insidious cases of iridocyclitis, in which, on the one hand, an extensive tissue-destruction and consequent anaphylaxis of the uvea is to be assumed, and, on the other hand, no acute disease exists as a cause, but rather a chronic or long-continued constitutional anomaly exists, both eyes are diseased in the majority of cases, we can answer, on the basis of our statistics, that just in such cases the disease was unilateral, at any rate, for over a year.

One of these cases finally came to enucleation. The anatomical finding in this eye, which was reported in detail by Gilbert, showed not the slightest resemblance to the picture which is characteristic for sympathetic inflammation.

We will also see that, from the statistics of the material in the clinic, the prognosis of sympathetic ophthalmia is entirely different. For at the same time that the 186 cases of spontaneous iridocyclitis were under observation, there were ten cases of sympathetic ophthalmia. Eight of these entered the clinic with well-developed sympathetic ophthalmia. In the remaining two cases, the sympathetic inflammation occurred, once after the proposed enucleation was refused, and another time after extraction with detachment of the retina.

Of these 10 cases, 9, *i. e.* 90%, are to be considered blind, according to the principles of Elschnig's statistics.

If we take the number of diseased eyes, out of 20, 19, or 95%, became blind.

If we compare with these figures the number of eyes blind from idiopathic unilateral and bilateral iridocyclitis, we find that out of 258 diseased eyes, 54 became blind. That is not quite 21% of blindness, as against 95% in sympathetic ophthalmia.

Of these nine cases of sympathetic ophthalmia, which, according to Elschnig, are to be considered as blind in the second eye, there were two, who, at the end of the first attack could still count fingers at 4 to 5 meters, and, in harmony with the experiences of Reis, retained this amount of vision even after several recurrences.

I would like to differ from Elschnig in favor of his theory in regard to these two cases, and not consider them blind. But even then, there remain, counting by cases, 70%, counting by eyes, 85%, of blindness from sympathetic ophthalmia, as against 20% and 21% from spontaneous iridocyclitis, a difference which speaks very decidedly against Elschnig.

If we consider further in the interest of Elschnig's hypothesis that we might accidentally have had especially favorable cases of spontaneous iridocyclitis, and especially unfavorable cases of sympathetic ophthalmia, the difference between 20% and 70% is sufficiently great to allow for such possibilities and yet give a marked difference between the outcomes.

But it is not necessary to make these exceptions in favor of Elschnig's hypothesis, for our results agree perfectly with those of Bach in this regard. For he saw 70% of iritis cured, and 15–20% of iritis and cyclitis occur bilaterally, which last number is very small, even as compared with our own experiences.

Our clinical statistics, therefore, speak for the fact that so-called idiopathic iridocyclitis differs from sympathetic ophthalmia, both from the point of view of its double-sided occurrence, as from the point of view of the prognosis and outcome of the disease.

The clinical picture can therefore not be taken as support for Elschnig's hypothesis of the occurrence of sympathetic ophthalmia.

I wish to express my thanks to Privatdozent Dr. Gilbert, for his suggestions in regard to my work.

REPORT OF THE TRANSACTIONS OF THE SECTION ON OPHTHALMOLOGY OF THE NEW YORK ACADEMY OF MEDICINE.

By GEORGE H. BELL, M.D., Secretary.

H. H. TYSON, M.D., CHAIRMAN. MONDAY EVENING, OCTOBER 19, 1914.

Dr. M. J. Schoenberg presented (1) a patient with **chorio-retinitis juxta papillaris** (Jensen). The patient, a girl, 18 years of age, a dressmaker, noticed two months ago that she could not see with her left eye. A week later, she called for consultation, and her condition was found as follows: V., O.D., $\frac{20}{30}$ +; O.S., movement of hand. Fundus, O. D., normal; O. S., optic disk congested above, hazy below and temporally, as if covered by a thin whitish exudate. Further temporally, at a distance of about 2 p.d. from the disk, and somewhat below, a white area, somewhat smaller than that of the disk; almost round, woolly in appearance, and slightly prominent. A small retinal vessel disappears in the thickness of this white area at its nasal margin. A red, small, horizontal streak—probably a hemorrhage—is seen on the surface of this area of infiltration. A little below this white spot, there is a dark patch with some streaks of choroidal atrophy and retinal blood-vessels running over this pigmented area. The vitreous is full of a dusty mass; besides, a veil-like string extends on the nasal side in antero-posterior direction, but does not seem to have any fixed connection with the disk or retina. During the first ten days while under my observation, several round, pale, small foci appeared around the white patch, mostly below and to its inner side. After about ten days, they began to unite into a sinuous line. At present the process seems to retrogress, as the patch begins to flatten, and the area around is less congested and begins to show signs of pigmentation.

The general condition, the family or the personal history, give no clue to the present trouble. She has been constantly feeling well, and looks well. Her parents and eight brothers and sisters are in good health. No lues or tuberculosis in the family. The physical examination, including a careful study of the nose, mouth, Wassermann and tuberculin (subcutaneous) tests, urine examination, blood count, and differential count, is all negative.

The first cases of this kind described by E. Jensen, and the majority of those described by Groes-Petersen, are young girls in apparently perfect health. The condition is relatively benign, as it has no tendency to spread, but recurrences are frequent. In my own case, the dark patch seen below the area of infiltration speaks in favor of a previous attack. The vision is at present $\frac{20}{100}$, and the field of vision, normal to the periphery, shows a central scotoma of about five degrees around the fixation point. The blind spot is slightly larger, but there is no connection between the two scotomas. The refractive condition in both eyes is a slight degree of hyperopia.

(2) The second patient (**intraocular foreign body**) presented by Dr. Schoenberg was a laborer, 23 years of age, who twelve years ago was the victim of the explosion of a cap. The left eye was "sore" for a few months after the accident. Seventeen months ago, the patient had a cataract extraction. The eye had remained quiet up to the time of the operation and also after that until six months ago, when it became painful and red. When he came to the clinic, he had an iridocyclitis of the left eye. V., O. D., $\frac{20}{20}$; O. S., movement of hand. Light projection, good; fundus could not be seen on account of the vitreous opacities. The iris presented a small yellowish prominence below and to the temporal side of the pupillary margin, and a pin-point grayish mass of exudate on either side of this prominence. The X-ray shows the presence of a foreign body about $1\frac{1}{2}$*mm* long in the zonular region at the temporal lower quadrant. The foreign body seems to be non-magnetic, and the history of the accident points to a piece of copper. The explanation of why the eye remained quiet for so many years with that piece of copper in its

interior may be given by admitting that the foreign body may have been in the lens cortex and that the cataract operation may have dislodged it farther down behind the iris, following which the present iridocyclitis resulted.

Dr. R. G. Reese presented (1) a man, age 35 (**intraocular foreign body removed through scleral incision**), who had had a foreign body in the globe for forty-eight hours, when first seen by him. The foreign body entered the eye through the sclera, and the X-ray showed that it was projecting through the sclera on the opposite side into the orbit. The foreign body was pulled back into the vitreous and then extracted through a triangular opening in the sclera, which was made between the superior and external recti muscles. The triangular incision was so made that the base of the conjunctival flap corresponded to the apex of the scleral flap. No vitreous was lost at time of operation. The size of the foreign body was 2 x 16 *mm.* The vitreous is still filled with blood, but the patient has light perception.

(2) The second case presented by Dr. Reese (**intraocular foreign body**) gave a history of having had a foreign body in the eye for five years. The vision had been failing for three years, but the pupil reacted to light. The foreign body was located by the X-ray in the ciliary body. The magnet was tried, but with no effect. He then extracted the lens, which had become cataractous. At the time of the extraction the stain of the foreign body (iron rust) could be seen on the side of the lens. He slipped the Kalt forceps behind the iris and tried to dislodge the foreign body, without any result. Two weeks after another iridectomy the iron particle could be seen and was extracted with the forceps. The size of the foreign body was 1 x 2*mm.* With sphere + 11 vision was normal.

Dr. Oscar Diem presented a patient on whom the Kroenlein operation and decompression for **retrobulbar tumor** had been performed on October 19, 1914. The man, 21 years old, married, with no history of lues or tuberculosis and no previous eye affection, noticed in the second half of October, 1913, swelling and pain of the left eye, and two weeks later had double vision when looking to his left. In December, 1913, he consulted an eye hospital, where through an incision

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on the lower orbital margin a piece of tumor was excised,—microscopically found to be carcinoma,—and operation, with perhaps enucleation, was proposed, which the patient refused. He came under our observation, through his private physician, on December 22, 1913, with vision in right eye $\frac{20}{70} + 25 + 50$ 90°, otherwise normal. Left eye, vision $\frac{20}{70}$; scar on lower orbital margin; limited motility temporally and downward; protrusion of 4*mm*; clear media; pronounced choked disk. No palpable tumor. No vessel noises. No changes when compressing vessels of neck. Wassermann negative. Negative examination in skin, nose, nervous, Roentgen departments. Diagnosis: Retrobulbar tumor, perhaps of inflammatory nature. Therefore, the patient was referred to his physician for anti-luetic treatment,—which was done with mercury injections, salvarsan injections, rubbing with mercury ointment, until he came to our next observation on June 16, 1914, which showed vision worse, increased protrusion, increased choked disk; Wassermann negative. June 16, 1914, during Kroenlein operation by Dr. O. Schirmer, a tumor on the floor of the orbital cavity—with no limit to be reached backward—was found, and a piece which was excised for microscopic examination showed an inflammatory tumor. Good recovery. July 15, 1914, the patient came with these complaints: headache, with dizziness and vomiting; vision of right eye rapidly deteriorating. Findings:—Right eye: vision, finger-counting at ten feet; incipient choked disk. Left eye: as before. Wassermann negative. He was directed into surgical hands. He received anti-luetic treatment. Wassermann was for the first time 1+. The brain symptoms increased, and the vision diminished rapidly in both eyes,—in left eye, even to amaurosis. Decompression through excision of a large piece of the left temporal bone was done on July 29, 1914, by Dr. M. Rehling, who found, after incision of the dura, infiltration of the vessels of the pia, considered to be of syphilitic nature. The vision and general condition improved rapidly. The anti-syphilitic treatment was continued. September 21, 1914: Vision: R., $\frac{20}{200}$ L., hand motion before eye. Disk in right eye, slightly indistinct; in left eye, the same, with incipient atrophy temporally; eyeball, little protruded. October 2, 1914: Right: $\frac{20}{70} + 15 + 50$ 90°; left, hand motion before eye. Right disk still more distinct; left, the same, but atrophy more pronounced.

Dr. J. H. CLAIBORNE thought the results from the Kroenlein operation in this case were very striking indeed. The experience that he has had proves to him that the Kroenlein operation is not always necessary. A number of years ago, a woman came to him with a tumor of the orbit and marked proptosis. He made a very deep incision along the top of the brow and on putting in his finger he found the tumor, which extended back to the optic nerve. In operating, he also chipped off a portion of the outer side of the orbit so that he could get at the tumor better. He removed the tumor through this incision. Another objection to the Kroenlein operation is that it always leaves a big scar.

Dr. T. R. CHAMBERS said: "I don't see where the scar comes in. I've done several myself, and almost all the scar disappears after a time."

Dr. R. G. REESE had seen this patient at the Infirmary. This operation could not have been done according to Dr. Claiborne's method. A solid mass was found in the lower portion of the orbit, when the man was put under an anæsthetic. He made an incision and removed a small piece for examination. Wassermann negative. T. O. negative. X-ray negative. Vision, at first normal; afterward, a neuro-retinitis developed. The laboratory report was carcinoma. The patient refused further treatment; was put on mixed treatment, and discharged.

Dr. TYSON stated that he was present at the time Dr. Schirmer performed the Kroenlein operation on Dr. Diem's patient, and that the appearance of the tissue was that of an intense inflammatory nature, probably specific. He did not think that the orbit could be explored as satisfactorily with the operation mentioned by Dr. Claiborne as with a Kroenlein, and in his opinion in this case especially the Kroenlein was the better operation.

Dr. CLAIBORNE then said: "My suggestion was not to offer my operation instead of Kroenlein's in all cases, but I think there are a great many retrobulbar tumors that can be removed in this way."

Dr. DIEM said that Kroenlein had first performed this operation in 1886, and he employed it for the next three years before he published the results. It proved to be a great thing in ophthalmological surgery. Dr. Claiborne's operation could not have been done in this case.

Dr. A. D. Mittendorf presented a case of **retinitis proliferans** in a woman 46 years of age. Diagnosis when first seen three years ago: Retinal arteriosclerosis; no hemorrhage. At that time, V. O. D., $\frac{20}{50}$; V. O. S., $\frac{20}{40}$. In June, 1913, numerous small retinal hemorrhages could be made out and old scars. A fine, transparent skin, with crescentic margin, with numerous blood-vessels, was seen extending over the inner half of both nerves, while nasally it passed into the retina. Have seen patient many times since then, and could watch skin gradually extend over both optic nerves. October 23, 1913: Small vitreous hemorrhage which has entirely absorbed. September 5, 1914: For the first time it could be seen that the transparent skin of vessels was elevated from the optic nerve and beginning to extend into the vitreous. This has become more marked, and the apex in the right eye is raised about five diopters. Vision on October 19, 1914: O.D., $\frac{10}{200}$; O. S. $\frac{15}{200}$. Wassermann negative. Urine, 2.5% sugar. Trace of albumin and casts are found.

Dr. G. H. Bell presented a patient, 48 years of age, with **ophthalmoplegia totalis** and a specific history. The urine was negative, and the blood pressure normal. Wassermann was negative. A lumbar puncture was made, and the spinal fluid was positive. It was then decided to give him an intraspinal injection. He was given a full dose of salvarsan in the vein of his left arm at nine o'clock A.M. and an hour later 60*cc* of blood was taken from him. The Swift and Ellis method, as modified by Mr. Birchell of the New York Eye and Ear Infirmary, was followed. At three o'clock of the same day 15 *cc* of the salvarsanized serum was injected into the spinal column. The patient experienced little or no pain at the time of the injection, and there was no reaction and no pain in head or back of neck following the operation. He was allowed to leave the hospital in 36 hours, at which time inunctions and sat. sol. K. I. internally were prescribed for him. At the end of two weeks, there was marked improvement. Four weeks from the time he had his intraspinal injection of serum he was able to return to work. Vision in both eyes, normal.

Dr. H. H. TYSON presented a case of **degeneration of cornea.** The patient was a married woman, age 51. Ten months ago she noticed a small white dot, the size of a pinhead, on the cornea of her eye. At that time her eye felt "scratchy," but was not inflamed nor painful. No previous history of traumatism or sore eyes. The white patch has gradually increased in size until at present it is about 3*mm* in diameter, with slight injection of cornea toward the side of the patch which is located in the substantia propria, extending from the edge of the pupil to within about 2*mm* of the sclerocorneal junction. The superficial epithelium is slightly raised but not broken. No pain; corneal sensibility diminished over area. Wassermann and von Pirquet, negative. Urine: specific gravity, 1020; acid; trace of albumin; no sugar. The etiology in these cases is obscure. Fehr, who has reported similar cases, thinks they are due to development of hyaline masses in the superficial lamellæ of the cornea, in which crystals of phosphate of sodium are subsequently deposited; while Fuchs, who in one case examined microscopically a section of the cornea, found it softened and with Bowman's membrane absent. The deposit was amorphous and was located in the substantia propria. In Dr. Tyson's case, the degeneration is probably influenced to a certain extent by a defective metabolism.

Dr. M. J. SCHOENBERG made a few remarks about **general and local ocular anaphylaxis,** mainly about its theoretical and practical importance and practical significance, its application to the understanding of various complicated problems in physiology, pathology, and especially ophthalmology. He then spoke about ocular anaphylaxis and its relations to the rest of the organism; and finally reviewed his own experiments on rabbits, in which he used as an antigen human serum or tuberculin. His conclusions were that with the above-mentioned antigens it may be possible to produce a state of anaphylaxis in the eyes of rabbits by sensitizing the organism first and then the eyes, or *vice versa.*

Dr. A. E. DAVIS opened the discussion on Dr. Schoenberg's paper, and after expressing his appreciation of it, said: "I am especially interested in the anaphylaxis produced by the tuberculins. That the various tuberculins are true antigens and are capable of producing anaphylaxis, and in this way bringing about immunity to the action of tubercle bacilli, there is no longer any doubt.

"It may be well to state, in passing, that so far neither in animals nor in man have we been able to establish a complete or absolute immunity (protection) against tuberculosis. It is only relative or partial. While a lesion may be healed and the resisting power of the individual be greatly increased, it does not insure that the reinfection may not take place if the subject is exposed to a virulent infection. It should be stated also that spontaneous immunity to the disease may take place; that is, the patient may manufacture antibodies as the result of the secretion of toxins from the living tubercle germs with which he is infected, and a cure result. Here again the resistance to future infection is greatly increased and usually renders the subject immune to mild infections, but the immunity is not absolute and the subject may be reinfected by a virulent type of tubercle bacillus.

"I also hold the same opinion, so concisely stated by Hamman and Wolman in their recent publication, 'Tuberculin in Diagnosis and Treatment,' which is to the effect: 'Until contradictory evidence is forthcoming, if such evidence can ever be obtained, the conclusion is completely justified that all tuberculins, if active, owe their activity to the presence of the specific protein of the tubercle bacillus,—whether this be in solution, in ultra-microscopic particles, in microscopic particles, or in unaltered bacillary bodies. In its broad principles, tuberculin hypersensitiveness unquestionably is closely related to the phenomenon of protein hypersensitiveness. The time of its development after infection, the character of the reaction symptoms, its elevation following the administration of small amounts of tuberculin, are all important points.'

"It is only by such practical and valuable experiments as related by Dr. Schoenberg, that we may hope to bring about even a tolerable understanding of this intricate subject of anaphylaxis and its bearing on immunity and the cure of disease. Incidentally, his paper emphasizes the necessity of animal experimentation if we are to advance in the knowledge of medicine."

Mr. E. BIRCHELL said: "It has been my privilege, through the kindness of C. E. MacDannald, to obtain the histories of the parents of a number of children afflicted with hereditary interstitial keratitis. The father usually gives a positive history and a negative Wassermann, and the mother a negative history but strongly positive serum reaction. The blood of the keratitis patients invariably reacts positively to Wassermann and Noguchi tests. These observations suggested to me the examination of the semen of several of the parents as to the presence or absence of the spirochætæ—with uniformly negative results. I examined and found negative the blood of a man who had intercourse with a woman whose blood gave a four plus Wassermann; her child had interstitial keratitis, and her husband a positive history but negative serum test. These findings seem to bear out to some extent the paper of Dr. Schoenberg, for in these cases it would hardly appear as though the spirochætæ were the cause, but rather some highly sensitized protein substance capable of producing anaphylaxis."

Dr. W. B. WEIDLER expressed his appreciation of Dr. Schoenberg's most excellent and interesting paper, and said that he himself had been using tuberculin for diagnosis and treatment, but that this paper presents a new phase of the question; and he asked Dr. Schoenberg to explain how tuberculin acts in these cases of ocular tuberculosis.

Dr. SCHOENBERG replied that he could not give a very plausible explanation. It seems probable, however, that the injection of tuberculin in a patient with some tuberculous affection—and consequently previously sensitized by t. b.—produces an anaphylactic reaction, locally, in the eye, if the case is one of ocular tuberculosis. Since we control our reaction by using infinitesimal doses, the local anaphylaxis in the eye consists only in a more or less marked hyperæmia, which acts beneficially upon the focus. So we see that in tuberculin therapy we employ the anaphylactic reaction as a curative measure.

REPORT OF THE TRANSACTIONS OF THE SECTION ON OPHTHALMOLOGY OF THE ROYAL SOCIETY OF MEDICINE.

By Mr. C. DEVEREUX MARSHALL, F.R.C.S., London

An ordinary meeting of the Section was held on Wednesday, November 4th, the President, Mr. Priestley Smith, F.R.C.S., in the Chair.

Mr. Hugh Thompson showed a young girl who had dilated pupil of Argyll-Robertson type, with well-marked contraction on closure of lids. The condition was not congenital in her, because two years ago her pupils were normal, and she had only slight myopia. The knee-jerks were normal. He also exhibited a case of **one-sided internal ophthalmoplegia.** The man was invalided from the Navy two years ago on account of supposed aneurysm. He was a stoker in the Navy, and since he left he had been doing similar work—stoking—in a brewery. Sir John Broadbent failed to find signs of an aneurysm.

Mr. Rockcliffe spoke of two cases in his experience with **mydriasis and iridocycloplegia.** In one there was a strong family history of retinitis pigmentosa, but in the patient there was no retinal or pigmentary change. One patient's end was in an asylum as a general paralytic.

Mr. N. Bishop Harman showed a case of **congenital entropion.** The lashes in the lower lid were permanently erect, and the child was born with the condition. The Meibomian glands seemed deficient. The mother was normal, but the grandmother was said to have had a double row of lashes. He proposed to split the lid, so as to separate the lashes from the glands, and graft between the two a strip of mucous membrane. If that succeeded, he expected the lashes would be prevented from reaching the cornea again. Mr. Mayou referred to three similar cases which he had had. He operated upon them by taking out a narrow band of skin on the outer side of the lid. There had been no recurrence, though one was operated upon five years ago.

Mr. Bishop Harman read notes of a case of **high myopia** in an infant.

Mr. W. H. Jessop showed a case of **tumor of the lower lid,** which he regarded as a lymphangioma. Skiagrams showed nothing abnormal about the bones, and skilled nasal investigation was negative. Surgeon-Major Elliot mentioned a similar case which he saw in India, and which was found to be sporotrichosis ochonelia. Mr. Leslie Paton said he had seen a similar case following the extensive scarring from lupus, and there was complete blockage of the lymphatics draining the eyelid. He asked a colleague to establish a permanent drain into the lymphatics of the lip. Mr. Harman reminded members of a case shown at the Laryngological Section in which drainage was done into the neck, and answered fairly well.

Mr. A. W. Ormond exhibited a case for diagnosis, which was generally regarded as inflammatory.

Mr. H. L. Eason exhibited an interesting example of **confluent tubercle of iris.** Tuberculin had not improved it. As perforation was occurring in the ciliary region, the only course was removal of the eye. He had had a case in which perforation occurred in three weeks; in this case it commenced in the fifth week of the history.

Mr. Dawnay showed a patient suffering from **intraocular metastatic carcinoma.**

Mr. W. T. Holmes Spicer read a communication entitled **Cysts in the anterior chamber arising from the pars ciliaris retinæ,** and illustrated it by a number of slides. The case had been under observation seven years; it began with a white spot at the edge of the pupil at three months of age. At 16 months, when first seen, there were three opaque, finger-shaped masses coming into the anterior chamber from behind the iris. Four years later these had disappeared, and a cyst about 4*mm* in diameter was seen floating freely in the anterior chamber. Other cysts appeared later, and finally there were seven, floating like toy balloons in the anterior chamber. In the meantime the eye had become glaucomatous, a ciliary staphyloma had formed, and the eye was removed. The pathological examination was made by Mr. Greeves. It was found that the cysts were formed of embryonic retinal tissue, containing vitreous. They had their origin in the pars ciliaris retinæ, starting from cellular membranes which grew over the iris and also into the vitreous; the cysts grew on the surface of these membranes. There was, in many places in the walls of the cysts, a resemblance to glioma tissue The case further proved the non- mesoblastic origin of the vitreous.

Mr. TREACHER COLLINS, discussing the case, said it bore out the view of the embryologists that the vitreous tumor was derived from neural epiblast, and that it was derived from only one portion of it.

Mr. MAYOU referred to a case of his own in which there was a **pigmented tumor in a microphthalmic eye,** consisting of epithelial cells. It occupied only an eighth of the segment of the ciliary body.

Mr. W. LANG spoke of a case he saw with Professor Fuchs in which there was a semi-translucent brownish cyst in the anterior chamber. Since then he had had a similar case of his own, but an attempt to deal operatively with it was not a success.

QUARTERLY REVIEW OF THE PROGRESS OF OPHTHALMOLOGY.

By H. KOELLNER, Berlin; W. KRAUSS, Marburg; R. KÜMMELL, Erlangen; W. LOEHLEIN, Greifswald; H. MEYER, Brandenburg; W. NICOLAI, Berlin; H. PAGENSTECHER, Strassburg; K. WESSELY, Würzburg; and M. WOLFRUM, Leipsic, with the Assistance of Drs. ALLING, New Haven; CALDERARO, Rome; CAUSÉ, Mainz; DANIS, Brussels; GILBERT, Munich; GRÖNHOLM, Helsingfors; v. POPPEN, Petrograd; TREUTLER, Dresden; and VISSER, Amsterdam.

Edited by MATTHIAS LANCKTON FOSTER, M.D., New Rochelle, N. Y.

SECOND QUARTER, 1914.

I.—GENERAL OPHTHALMIC LITERATURE.

See Book Reviews.

II.—RELATIONS OF OPHTHALMIC TO GENERAL DISEASES, INCLUDING POISONS.

1. BARTELS. M. **Hypophyseal disturbances.** *Klin. Monatsbl. f. Augenheilk.*, May, 1914, p. 664.

2. BENEDICT, W. L. **A study of the eye grounds in psychoses.** *Annals of Ophthalmology*, April, 1914.

3. FERNANDEZ, JUAN SANTOS. **Ocular syphilis in our ophthalmic practice.** *Clin. Opht.*, p. 305.

4. FISCHER, J., and TRIEBENSTEIN, O. **Researches concerning tetany and senile cataract.** *Klin. Monatsbl. f. Augenheilkunde*, March–April, p. 441.

5. FISCHER–GALATI, TH. **New relations between the nose and the eye.** *Monatschr. f. Ohrenheilk. u. Laryngo-Rhinologie*, xlviii., p. 136.

6. FLEISCHER, B. **Pathology of tumors of the hypophysis.** *Klin. Monatsbl. f. Augenheilkunde*, May, p. 625.

7. GALLEMAERTS. **Chloroma with intraocular metastases.** *Ibid.*, June, p. 878.

8. GRUMME. **Concerning the theory of exophthalmic goiter, myxœdema, cretinism, and goiter. Hyper- and hypothyroidismus.** *Berliner klinische Wochenschrift*, No. 16, p. 737.

9. Haertel, Fr. **Concerning the treatment of trigeminal neuralgia by intracranial injection.** *Medizinische Klinik*, No. 14, p. 582.

10. Hilbert, R. **Yellow vision sometimes appearing in jaundice.** *Centralbl. f. prakt. Augenheilkunde*, March, p. 67.

11. Jess, A. **Headache and the eye.** *Berl. klin. Wochenschr.*, p. 629.

12. Krailsheimer, R. **Tumor of the hypophysis.** *Klin. Monatsbl. f. Augenheilkunde*, March-April, p. 529.

13. Loehlein, W. **Early cataract with atrophic myotonia.** *Ibid.*, p. 453.

14. Maklakow, A. **Ocular manifestations in a case of telangiectasia of the cerebellum.** *Annal. d'oculistique*, cli., p. 252.

15. Patton, J. M. **Ocular symptoms associated with oxycephalus or tower skull.** *Annals of Ophthalmolgy*, April, 1914.

16. Polland, R. **Treatment of syphilis with embarin.** *Therapie d. Gegenwart.*, 1914, p. 161.

17. Raubitschek, E. **Papillitis in albuminuria.** *Klin. Monatsbl. f. Augenheilkunde*, March–April, p. 457.

18. Reichmann, Fr. **Pupillary disturbances in dementia præcox.** *Arch. f. Psychiatrie u. Nervenkrankheiten*, liii., 1, p. 302.

19. Tietze. **A tumor of the brain successfully removed.** *Berliner klinische Wochenschrift*, No. 15, p. 716.

20. Uhthoff, W. **Two notable cases of tumors of the hypophysis.** *Klin. Monatsbl. f. Augenheilkunde*, March–April, p. 529.

21. Ulbrich, H. **Sudden onset of bitemporal hemianopsia.** *Ibid.*, p. 536.

22. Vinsonneau. **Ocular lesions in epidemic cerebrospinal meningitis.** *Annales d'oculistique*, cli., p. 466.

23. Von Eiken. **Retro-auricular abscess with choked disk. Sinus thrombosis on the right side with choked disk.** *Med. Klinik*, No. 14, p. 612.

24. Wehrli, E. **Tumors of the hypophysis and treatment with organ extracts.** *Klin. Monatsbl. f. Augenheilkunde*, May, p. 653.

GRUMME'S (8, **Hyper- and hypothyroidism**) theoretical views may be summarized thus: 1. The primary cause of myxœdema is a lack of iodine in the food and so a lack of iodine to be metabolized. 2. The cause of exophthalmic goiter is a thyroid gland rendered functionally weak by an overabundance of iodine in the food. Hence myxœdema is benefited by an organic thyroiodate, while exophthalmic goiter is injured by iodine in any form, organic or inorganic. He also ascribes endemic cretinism and endemic goiter to a lack of iodine in the food of the child or of the mother, hence these diseases are not met with where people have much iodine in their food. Exophthalmic goiter he believes to be neither hyperthyroidism, nor hypothyroidism, but rather to be caused by an excess of exogenous, unassimilated iodic albumin. In myxœdema he thinks the hyperthyroidism to be at most secondary.

Jess (11, **Headache and the eye**) briefly reviews the most important anomalies and diseases of the eye that give rise to headache, and of diseases of other organs the initial symptom of which frequently is headache and the early diagnosis of which can often be made only through an accurate examination of the eyes. He deals specially with the heterophorias met with in neurotics and epileptics, the most obstinate of which is hyperphoria. Cyclophoria is less common. He also speaks of insufficiency of the convergence, or accommodative asthenopia, the occipital headache often associated with affections of the margins of the lids and conjunctiva in emmetropes and particularly in hyperopes, glaucoma, with a short differential diagnosis from iritis, choked disk as a symptom of increased pressure within the skull, retinitis albuminurica with nephritic headache, with particular reference to retinitis albuminurica gravidarum. The therapeusis of heterophoria, glaucoma, and choked disk in particular is briefly described.

Fischer and Triebenstein (4, **Tetany and senile cataract**) have instituted systematic researches on patients with senile and presenile cataract, the results of which render it probable that the parathyroid glands have an etiological significance in the occurrence of senile cataract. They found positive signs of latent tetany in sixty out of sixty-eight patients with senile cataract—that is, 88.2%. On the other hand, in twelve cases without cataract the diagnosis of latent tetany was negative in ten, positive in one, doubtful in one. The signs of latent tetany are therefore to be met with much more commonly in people with senile cataract than in persons with clear lenses, and this leads us to suspect a pathogenetic connection between tetany and senile cataract. In most cases the history rendered it probable that the tetany appeared first in old age.

In Loehlein's (13, **Early cataract with atrophic myotonia**) 29-year-old patient the lens of the left eye was uniformly opaque, while the lenticular opacities in the right were much more delicate, consisting of radiating groups of points and punctate clouds. The right papilla was pale yellow, and an arched scotoma was present, extending out from the blind spot. The neurological examination revealed atrophic and paretic symptoms in the musculature of the face and limbs, with absence of the tendon and radioperiosteal reflexes. As there were no signs of syphilis, tuberculosis, or disease of the accessory sinuses, the atrophic changes in the optic nerve were held to be etiologically connected with the atrophic myotonia and the early cataract.

Fischer–Galati (5, **New relations between the nose and the eye**) report three peculiar cases. The eye symptoms in the first case were hemeralopia and poor vision, in the second bad vision and weariness during near work, in the third loss of vision to counting fingers with a large central scotoma. In all three adenoids were found in the nasopharyngeal space, and vision was restored after they had been removed. The symptoms could not be imputed wholly to hysteria. In the second and third cases a toxic retrobulbar neuritis might perhaps be suspected to have arisen from the plugs of pus that filled the tonsillar crypts, which produce during decomposition substances that are harmful to the papillomacular bundle. In the first case the blood was surcharged with carbon dioxide in consequence of the difficulty of respiration, whereby irritation was exerted not only on the respiratory center, but also on the fibers of the trigeminus, resulting in dilatation of the choroidal, and contraction of the retinal vessels. After this irritation of the trigeminus had been removed the retina remained only moderately injured.

Hilbert (10, **Yellow vision sometimes appearing in jaundice**) describes a case of carcinoma of the liver in which, after a rapid yellow discoloration of the eyeball and of the entire skin, yellow vision ensued. Bright objects appeared to the patient to be sulphur yellow, dark brownish, and dirty, yet the vision was good. A greenish-yellow discoloration of the cornea and lens could be distinctly seen by oblique illumination.

Gallemaerts (7, **Chloroma with intraocular metastases**) clinically saw intraocular metastases in a case of chloroma with tumors in the lungs, liver, kidneys, heart, meninges, and brain. He saw retinal hemorrhages, white spots in the retina, and a tumor of the papilla. At the autopsy the retina was found to be detached and full of chloromatous tumors, with a tumor also in the choroid. The differential diagnosis from leucæmia was made through the green pigment.

Tietze (19, **Tumor of the brain successfully removed**) reports the case of a patient 37 years old who had had a traumatism to the skull long before. Eleven years later, symptoms of numbness appeared, which gradually increased for four years, and were associated with pareses and finally with sudden blindness. On opening the skull an apparently inoperable diffuse tumor was found next to a large piece of bone over the right central convolution, beneath the dura. All symptoms rapidly disappeared after this decompression, but as they returned the tumor was removed two years later. The operation was very bloody. The tumor was soft, grayish yellow, and fibrous; microscopically it proved to be a glioma. The patient made a good recovery.

Fleischer (6, **Pathology of tumors of the hypophysis**) has collated fifteen cases. The period of observation in the majority was from two to fifteen years. These show that as a rule the loss of vision is not to be arrested without operative intervention. The pure complete bitemporal hemianopsia is only a transient symptom; while in many cases there is an advancing temporal contraction of the field, paracentral, bitemporal scotomata occur in some, and central scotomata may appear early. Often one may find a far advanced disturbance of the color perception with a normal field for white. The central scotoma may be explained by laceration and stretching of the macular fibers in the chiasm without immediate pressure by the tumor. Operation was productive of a very good result in three cases, preservation or improvement of the vision, and good general condition. In the opinion of the author success depends less on the method of operation than on the familiarity of the surgeon with the method employed. At all events he considers operative treatment imperatively indicated, especially when blindness is threatened.

On the other hand, Wehrli's (24, **Tumors of the hypophysis and treatment with organ extracts**) case shows that tumors of the hypophysis may be improved or cured without operation. In his patient the chiasm was compressed from below by a tumor of the hypophysis, while hypophyseal obesity and loss of genital function contraindicated operation. The treatment given was at first potassic iodide and tablets of the hypophysis, later the latter alone. At the end of nearly three years the improvement of the vision of the right eye was from 0.1 to 1.4, that of the left from movements of the hand at 30*cm* to counting fingers at 1¼*m*. There was a considerable optic atrophy at the time of the first examination. The visual field had lost its bitemporal hemianopic character and had enlarged considerably; the body weight had fallen from 135 to 120*kg.*; the headache and debility had disappeared. The author emphasizes two facts: The visual field was hemianopic very early and for a long time alone for colors, while the limits for white were irregular, and the marked atrophy from pressure was capable of very marked improvement and restitution. His recommendation of this form of treatment, 0.1 gram tablets of hypophysis, in combination with small doses of iodide of potassium, he confines to cases of hypopituitarism, dystrophia adiposo-genitalis.

BARTELS (1, **Hypophyseal disturbances**) is of the opinion that in the cases of tumors of the hypophysis with dystrophia adiposo-genitalis, in which the primary homologous sexual characteristics are stunted, the latter results are dependent not so much on the tumor as on a simultaneous congenital anomaly of the germ that leads to the development of the tumor and to the genital disturbances.

UHTHOFF (20, **Two notable cases of tumors of the hypophysis**) reports the two following cases. The first patient was 17 years old, a dwarf weighing 53 pounds. He had temporal hemianopsia of the right eye, the left had been totally blind for a long time, dilatation of the sella with a visible tumor, atrophy of the thyroid gland, and relatively good intelligence. The other patient, 21 years old, weighed 250 pounds. He had dystrophia adiposo-genitalis, was blind in one eye, and had relatively good vision in a small portion of the inner half of the field. His thyroid gland likewise was atrophied, and he showed symptoms of acromegaly. Neither patient was operated on.

KRAILSHEIMER'S (12, **Tumor of the hypophysis**) 38-year-old patient had a tumor of the hypophysis, marked acromegaly, and had been losing vision for about a year. She had a typical bitemporal hemianopsia and optic atrophy. She was operated on, died of meningitis, and the autopsy revealed in the greatly dilated sella an encapsuled tumor as large as a pigeon's egg. The chiasm and optic nerves were much thinned and flattened. Under the microscope the tumor proved to be an eosinophile adenoma. This case is confirmatory of the statement of Fischer that the tumor of the hypophysis accompanied by acromegaly is always an adenoma derived from the specific epithelium of the hypophysis, and consists almost wholly of eosinophile cells. Klestadt reported a similar case, in which the adenomatous tumor had extended far beyond the limits of the bed of the hypophysis and had eroded the neighboring bones, something that is very rare in tumors of the hypophysis.

In ULBRICH'S (21, **Sudden onset of bitemporal hemianopsia**) case there was a sudden onset of bitemporal hemianopsia, complete for red, associated with malaise and headache. The patient was 50 years old, had little hair, was of the feminine type, was rather slow, had always lacked libido sexualis, and was very thirsty. The Roentgenogram showed a very marked juga cerebralis and a dilatation of the sella. The diagnosis was fairly certain of a tumor of the hypophysis that had hitherto remained latent, into which a hemorrhage had probably taken place.

PATTON (15, **Ocular symptoms associated with oxycephalus**) reports three cases. In one there was an exophthalmos of 5*mm* to 7*mm* with left convergent squint. There was a low grade of retinal irritation with distension of the vessels and blurring of the disks. In the second case the eyes were markedly proptosed and there was a slight tendency to thickening of the lower lids. Slight retinal disturbances were present, with complete atrophy of the optic nerves and no light perception. The last case had exophthalmos of 7*mm* to 10*mm* with marked divergence in the left eye. Vision was reduced to about $\frac{7}{200}$. There was some disturbance of retinal pigment. Form and color fields were moderately contracted. The patient showed a complete eversion of the right lower lid with thickening of the conjunctiva and two operations were performed to correct the deformity. The other eyelid also was everted to a slight degree. ALLING.

FERNANDEZ (3, **Ocular syphilis in our ophthalmic practice**) made a statistical study of his 1697 cases with various syphilitic manifestations in the eyes and classifies the patients according to the seat of the disease, sex, age, time of the appearance of the ocular complications, etc. The percentage of cases with ocular lues was 3.37% in a material of over 50,000 patients seen during a practice of about 39 years. The reviewer's opinion is that since the Wassermann reaction could not have been used in the diagnosis of the largest part of these cases, the reader will have to take the findings of such statistical studies *cum grano salis*.

SCHOENBERG.

POLLAND (16, **Treatment of syphilis with embarin**) has tried embarin in the treatment of syphilis and concludes that it may be considered an advance in the injection of mercury, as it is not inferior to other preparations in efficiency and does not cause pain. The latter is due partly to the solubility of the preparation and the readiness with which it is absorbed, partly to the acoin that forms part of the combination. It may be used in combination with salvarsan.

RAUBITSCHEK (17, **Papillitis in albuminuria**) reports a case in which a papillitis occurred without material involvement of the retina in albuminuria. Such an occurrence is rather uncommon, but this case was also peculiar in that the affection did not appear in the second eye until after it had run an unusually rapid course in the first. A woman, 52 years of age, had suffered for a long time from granular atrophy of the kidneys. A high degree of choked disk was found ophthalmoscopically in the left eye. Three weeks later, after the papillitis in the left eye had already changed into atrophy, a choked disk appeared in the right and ran a similarly rapid course. Fine spots appeared secondarily in the retina, but the case could not be termed one of retinitis albuminurica, while the question of a pseudo-tumor did not arise, because of the absence of all other symptoms indicative of a tumor of the brain, and because such successive onsets of choked disk have never been observed in such a connection. The latter is also contraindicative of the view that the choked disk in this case might be considered a sign of increased intracranial pressure.

For obstinate cases of trigeminal neuralgia, such as those in which resection of the Gasserian ganglion has been performed, HAERTEL (9, **Treatment of trigeminal neuralgia by intracranial injection**) recommends the intracranial injection of 70–80%

chemically pure alcohol, which he has employed in twenty-four cases, with good results in the great majority. After administration of a soporific, a puncture is made under careful aseptic precautions with a ganglion canula 10*cm* long, made of pure nickel. Guided by the finger in the mouth this canula is introduced into the cheek opposite the second upper molar tooth, passed beneath the mucous membrane to the base of the skull and then directed upward. Statements of the patient concerning radiating pains inform us when the needle is correctly placed, and a test injection of novocain shows that the ganglion has been reached by an immediate anæsthesia of the cornea. Alcohol to the amount of 1*cm* is then injected drop by drop. The patient is then confined to the room for ten days with boric acid ointment applied to the eye twice a day, the eye in the meantime being kept bandaged. Later automobile, or ordinary protective, glasses are worn. The author obtained permanent anæsthesia in fourteen of his twenty-four cases, while of the remaining ten, five have had no recurrences, three had severe recurrent attacks at the end of four or five months, which were completely relieved by another injection, and two have had only slight attacks of pain. Among the complications should be mentioned two cases of paresis of the abducens, and particularly the danger of keratitis neuroparalytica caused by the anæsthesia of the cornea, which is to be prevented only by very careful after-treatment. The author himself believes that this method should be employed only when the indications are extremely urgent, but that it should be tried before resorting to resection of the ganglion.

VINSONNEAU (22, **Ocular lesions in epidemic cerebrospinal meningitis**) had the opportunity to observe two cases with eye symptoms in an epidemic of cerebrospinal meningitis. The first patient had an iridochoroiditis that terminated in atrophy of the eyeball. The course of the disease was very violent and could not be influenced therapeutically. Atrophy of the eyeball is the usual result in these cases. The second case had an inflammation of the optic nerve that appeared first as a hyperæmia of the papilla, then became a papillitis, and finally a neuroretinitis that terminated in optic atrophy. No treatment was effective. The prognosis seems to depend on the stage in which the disease appears, whether the meningeal infection is propagated along the optic tract or not.

CAUSÉ.

BENEDICT (2, **A study of the eye grounds in psychoses**) studied the eye grounds of over one hundred cases of psychoses in the following groups: 1. Psychoses due to organic brain diseases. 2. Imbeciles and epileptics. 3. Dementia præcox. 4. Functional psychoses. Of the thirty-five cases in the first group the fundus was normal in forty per cent. Out of five cases in the second group normal funduses were found in eighty per cent. In fifteen cases of dementia præcox 73.3% showed no abnormality. In the last division, fifty-two cases, one-half were normal. The results in dementia præcox differ from those of Tyson and Clark, who found changes in every one of one hundred and nine cases, varying from congestion of the disk to atrophy, but most of his cases were in the earlier stages of the disease. ALLING.

REICHMANN (18, **Pupillary disturbances in dementia præcox**) found disturbances of the light reaction in the greatest variety of forms, usually with intact reaction to convergence, in almost seventy per cent. of 215 cases. Among these may be mentioned eight cases of katatonic immobility to light, and fourteen of absence of light reaction in pupils influenced by ovarian pressure, the latter differentiating them from hysterical immobility of the pupils. She thinks she has found a fruitful hypothesis for the explanation of the katatonic immobility of the pupils in the probable connection between vasomotor changes and the disturbances in the innervation of the iris.

The first of the two patients reported by VON EIKEN (23, **Retroauricular abscess with choked disk**) had a bilateral choked disk with an extensive retroauricular subperiosteal abscess on the right side, originating from a ruptured, putrefying cholesteatoma. The papillitis was cured by the operation on the abscess and must be considered to be due to a collateral œdema within the skull. In the second case an operation for otitis media and suppuration in the antrum on the right side was followed by a high fever with distinct choked disk. The sinus was then laid bare and found to contain a long thrombus. Recovery followed ligation of the jugular vein.

MAKLAKOW (14, **Ocular manifestations in a unique case of**

telangiectasia of the cerebellum) reports the case of a patient who presented himself with a slight papillœdema and normal field and acuity of vision; later on, a spasm of convergens and a paralysis of the right superior oblique. Adding to these symptoms, nystagmus when looking to the sides, ataxic gait which could be clearly heard with the stethoscope on the left side of the cranium, and a gradual diminution of vision due to the progressing papillitis, the diagnosis of a tumor of the cerebellum was made. The patient died one week after the operation and a telangiectasis of the blood-vessels of the left side of the cerebellum was found.

SCHOENBERG.

III. GENERAL AND EXPERIMENTAL PATHOLOGY AND TREATMENT.

25. ABELSDORFF. **Experimental effects produced on the eye by injections of thorium x.** *Verl. ophthalm. Ges.*, May 21, 1914.

26. ASTRUC, E. **Tincture of iodine in ophthalmology. Tolerance of the cornea and conjunctiva.** *La clinique ophtalm.*, xx., p. 218.

27. BEAUVIEUX. **Treatment of ocular tuberculosis.** *Arch. d'ophtalmologie*, xxxiv., p. 278.

28. BONNEFOY. **Nascent vapor of iodine in ocular therapeutics.** *Annales d'oculistique*, cli., p. 470.

29. CALENDOLI. **Contribution to the experimental transmissibility of leprosy to animals by transplantation of fragments of leprous tissue in the anterior chamber.** *Annali di Ottalm.*, fasc. 5–8, p. 581.

30. DARRIEUX. **Treatment of ocular syphilis with salvarsan and neosalvarsan.** *Annales d'oculistique*, cli., p. 352.

31. DOR. **Treatment of ocular syphilis.** *Ibid.*, p. 381.

32. FRADKINE. **Neosalvarsan in ophthalmic therapeutics.** *La clinique ophtalm.*, xx., pp. 29 and 96.

33. KLAUSNER. **The pallidin reaction in ophthalmology.** *Klin. Monatsbl. f. Augenheilkunde*, June, p. 813.

34. KRAUPA. **Bacterial prophylaxis of operative infection.** *Ibid.*, March–April, p. 375.

35. LASAREW. **The local use of guaiacol in tuberculous diseases of the eye.** *Zeitschrift f. Augenheilkunde*, April–May, p. 456.

36. RAUCH. **The influence of embarin in syphilitic affections of the eye.** *Archiv f. Ophthalmologie*, lxxxviii., p. 184.

37. SCHANZ, FRITZ. **The basis of light treatment of diseases of the eye.** *Ophthalmology*, April, 1914.

38. STEINDORF. **Experimental studies of the effect of eel serum upon the human and the animal eye.** *Archiv f. Ophthalmologie*, lxxxviii., p. 158.

39. TRUBIN. **Intraocular anaphylaxis.** *Zeitschr. f. Augenheilk.*, p. 446.

40. UHLENHUTH and MULZER. **Atlas of rabbit syphilis.** J. Springer, Berlin.

41. ZADE and BARCZINSKI. **Sophol.** *Deutsche med. Wochenschr.*, p. 647.

42. ZIELER. **Salvarsan and ocular troubles.** *Muenchener med. Wochenschr.*, No. 26, p. 1481.

PATHOLOGY.

KRAUPA (34, **Bacterial prophylaxis of operative infection**) saw twenty-two cases of post-operative iritis after 635 operations for cataract during the years 1910–1912, half of which were not of mycotic origin. Among these abacterial cases of iritis he reckons those in which no germs could be found in the anterior chamber a short time after the onset of the inflammation, or no pathogenic bacteria were demonstrable at any time in the conjunctival sac.

TRUBIN (39, **Intraocular anaphylaxis**) finds that a single injection of foreign vitreous into the vitreous space of a rabbit produces only minimal signs of irritation which never recur; cord-like or cloud-like opacities are formed in the vitreous, but no changes take place in the fundus. But if the same injection is made in an animal that has been sensitized by an intravenous injection of the same kind of vitreous in large doses three or four weeks before the local injection, the signs of inflammation in the vitreous are more distinct, are very apt to recur, and are followed by such changes in the fundus as atrophic patches, proliferation of pigment, infiltration of the iris and ciliary body, exudates in the pupil, infiltration of the choroid, perineuritis and perivasculitis of the central vessels of the optic nerve.

STEINDORFF (38, **Effect of eel serum on the eye**) describes the clinical picture of conjunctivitis ichthyotoxica. He finds by experiments on rabbits that a complete congenital insensitiveness to the conjunctival instillation of eel blood serum occurs, and it is possible to obtain a transient local immunity by several instillations. But care must be exercised in judging the results of the experiments, because the toxicity of the serums of different eels is not the same, and they do not equally destroy the blood corpuscles. He confirms the statements of former authors that heating the serum to 56° for thirty minutes destroys the properties of the serum which excite inflammation and hæmolysis. The same result is obtained by irradiating the serum with ultra-violet light for forty-five minutes with Kromayer's quartz lamp. The immunization by instillation is purely local, and even that produced by subconjunctival injection does not extend to the other eye. By intravenous injection a very intense miosis is produced which is greater than that induced by alkaloids and does not yield to atropine, but this does not occur in immunized animals, when immune serum is injected at the same time, or when the serum has previously been treated with ultra-violet light. The cause of the miosis is unknown.

A piece of the cornea of a leper was introduced into the anterior chamber of a rabbit by CALENDOLI (29, **Experimental transmissibility of leprosy to animals**). The small mass increased in size until it reached the size of a hemp seed in four months, and then decreased. The animal was killed six months after the implantation. Microscopic examination showed a very large number of leprosy bacilli, not only in the implanted piece, but also in the anterior chamber and all the tissues adjacent to it, which exhibited a granular infiltration. The reproduction of leprosy bacilli in the eye of the rabbit by implantation of fresh fragments taken from lepers into the anterior chamber may be regarded as settled.

CALDERARO.

UHLENHUTH and MULZER (40, **Atlas of rabbit syphilis**) demonstrate that with a suitable technic of infection the rabbit is very susceptible to syphilis, contrary to former views, and that the forms exhibited resemble in many respects the syphilitic symptoms in man. The virus is introduced into the anterior chamber, and, unless suppuration occurs, the eye becomes perfectly quiet in from five to ten days. After a period of incubation that varies in length, a pericorneal injection and often an iritic irritation appear, followed by an opacity at the point of puncture. A keratitis develops, accompanied by a superficial vascularization, until the entire cornea is opaque and thick, in which condition it frequently remains for months. Spirochætæ can be found both in the pannus and in the deeper layers. A large number of pictures portray the conditions found.

KLAUSNER (33, **The pallidin reaction in ophthalmology**) has made 2000 cutaneous inoculations with pallidin to test its value in the diagnosis of syphilis. The preparation is made from lungs of syphilitic fetuses that contain spirochætæ, which are finely triturated, floated in slightly alkaline water, gently centrifuged, the cloudy top fluid containing spirochætæ is poured off, sterilized in a water bath for an hour at 60°, and mixed with ½% of carbolic acid. None of the 1600 control cases gave a positive reaction. Syphilis in the first and second stages and latent syphilis proved refractory, and positive reactions were secured only in gummatous and late hereditary syphilis. In these cases an inflammatory infiltrate was formed, which was often slightly papular and had an areola of erythema. All the symptoms started to retrograde on the third day. In a negative reaction there is only a moderate irritation of the vicinity that always disappears completely within forty-eight hours. The test was made together with Wassermann's in 100 cases of eye diseases in which syphilis was suspected; sixteen gave a positive Wassermann, twenty positive pallidin. In twenty cases of interstitial keratitis both reactions were positive in four, while in eight the pallidin was positive, the Wassermann negative. Three of these cases had had positive Wassermann previously, the fourth was clinically certain to be late hereditary syphilis, and in a fifth the Wassermann became positive later.

SCHANZ (37, **The basis of light treatment of diseases of the eye**) shows that the cornea absorbs light rays of short length, beginning with those of 360*mm*, and completely absorbs those of 300*mm*. The lens absorbs in the blue rays, and more completely in the ultra-violet. He also demonstrates the phenomenon of fluorescence in the lens and retina. He thinks that cataracts are the result of exposure of the eye through life to the short-ray end of the spectrum, and recommends euphos glass to cut off the invisible rays. On account of its stimulating effect he suggests the employment of light of short wave length in the treatment of corneal affections, using proper precautions in order to avoid the dangers incident to the exposure. ALLING.

Our knowledge concerning the action of radioactive substances on the normal eye has depended on experiments in which the rays enter the eye from in front, and the different parts of the eye were necessarily affected very unequally by them. To lessen this inequality and so obtain a more accurate idea of their effects, ABELSDORFF (25, **Experimental effects produced in eyes by injections of thorium** x) has introduced a solution of thorium x into the eye itself. This injection into the anterior chamber of rabbits produced a decolorization of the iris, which in sufficient doses increased to complete atrophy. Larger doses were accompanied by a parenchymatous keratitis, the formation of ulcers on the cornea, and severe conjunctivitis. Injections into the vitreous brought about great changes in the retinal vessels, hemorrhages and exudates, which finally resulted in the picture of a chorioretinitis that has run its course with partial atrophy of the optic nerve. The iris became decolorized; the lens remained transparent.

ADAM.

TREATMENT.

ZADE and BARCZINSKI (41, **Sophol**) call attention to the fact that the literature recommending sophol as bactericide to gonococci is based wholly on clinical material, and almost no test-tube experiments have been reported, so they undertook to supply this lack, which is rather important in view of the very fluctuating severity of different cases of the disease. Unfortunately they obtained very uneven results.

ASTRUC (26, **Tincture of iodine in ophthalmology**) observed three cases in which tincture of iodine was instilled into the eye by mistake for argyrol or protargol. Two were children with blennorrhea, the other an old woman with ulcer of the cornea and suppuration of the lacrimal sac. After the signs of a quite sharp irritation had passed away no injury was to be perceived of the cornea or conjunctiva, while the infectious process ran a strikingly better course. He concludes that the tolerance of the cornea and conjunctiva to iodine and alcohol must be greater than has been thought. CAUSÉ.

BONNEFOY (28, **Nascent vapor of iodine in ocular therapeutics**) produced iodine vapor by heating iodoform. It produces a lively pain in the eye, œdema of the conjunctiva, congestion of the margins of the lids, and affects the secretions of the glands of the lids and of the lacrimal sac. It may be used in chronic disease of the lacrimal sac, affections of the lids, ulcers of the cornea, and trachomatous pannus.

CAUSÉ.

BEAUVIEUX (27, **Treatment of ocular tuberculosis**) says that tuberculin treatment gives particularly good results in weakened tuberculosis, which is usually caused by the tuberculous toxin circulating in the organism. Iritis, with or without tubercles, iridocyclitis, keratitis, and serous or disseminated choroiditis are doubtless improved by its use. But no benefit can be obtained from it in inflammatory granuloma in children, it is more apt to do harm. Enucleation in such cases is the only means to prevent dissemination of the bacilli. Experience also shows, unfortunately, that a person who has had tuberculin treatment cannot be regarded as immune. Serum treatment must be supported by a strengthening general treatment. CAUSÉ.

LASEREW (35, **Local use of guaiacol in tuberculous diseases of the eye**) reports good results in nine cases. 1. Three cases of tuberculous conjunctivitis completely cured by guaiacol ointment applied locally. All three patients young, Pirquet positive, tuberculosis positive, diagnosed microscopically. 2. One case of caries of the orbit with fistula in a girl 7 years old, Pirquet positive, Wassermann negative, cured in four weeks by curetting and injection of a 1% solution of guaiacol. 3. Three cases of interstitial keratitis; Pirquet positive, Wassermann negative. Marked improvement from the subconjunctival injection of a 1% solution of guaiacol in a comparatively short time. 4. Two cases of uveitis regarded as tuberculous. Rapid improvement. In the discussion Auerbach and Golowin pointed out that the diagnosis of tuberculosis was not sufficiently established by Pirquet's test.

After a historical review of the treatment of syphilis DOR (31, **Treatment of ocular syphilis**) turns to arsenical medication inaugurated by Schaudinn's discovery, and goes deeply into treatment with salvarsan. The enthusiasm that welcomed a therapia sterilizans magna was soon dampened by evidence that the initial dose of salvarsan did not guard against the appearance of the secondary symptoms. Time has shown that this remedy, thanks to the discovery of neosalvarsan and the simplification of its administration, is very efficient, especially in acute syphilitic affections of the eye. Abortive treatment with salvarsan is indicated in chancre of the lids and conjunctiva, as well as in ulcers and gummata of the cornea and conjunctiva. Its action is uncertain in interstitial keratitis. Iritides, inflammations, and gummata of the ciliary body are to be treated with salvarsan to the limit of tolerance. In syphilitic cataract he recommends treatment with iodides, in vitreous opacities subconjunctival injections and sweating. In specific choroiditis mixed treatment, together with energetic local, is usually successful. The therapeutic influence to be obtained over tabetic ophthalmoplegias and diseases of the optic nerve is quite uncertain, but at least a temporary improvement may be obtained by mixed treatment. Salvarsan has brought no improvement to the treatment of diseases of the eye dependent on hereditary syphilis, especially interstitial keratitis. The energy of the treatment must generally be proportional to the severity and localization of the disease, and so the treatment may be divided into three grades: mild, consisting of intramuscular injections; strong, intravenous injections of soluble salts; and rapid, giving first mercury, then salvarsan, and then iodides. When a nephritis is present at the same time it should never be forgotten that this may be of specific origin. Tuberculosis and syphilis coincide, especially in children with interstitial keratitis, where in addition to the mercurial treatment a general treatment for tuberculosis is indicated. Salvarsan and mercury should be given simultaneously in cases of malignant syphilis. Salvarsan is a valuable remedy, but is not sufficient for all forms of syphilis in the eye. Perhaps Noguchi's luetin signifies a new era in the treatment of syphilis by syphilization.

In the discussion Antonelli and Lagrange were less favorable to salvarsan. Antonelli prefers the iodides in gummatous processes, mercury in iritic changes. He has observed nervous complications after the use of salvarsan, which did not always quite recover. The most important thing in the treatment of interstitial keratitis in addition to the local, is a strengthening diet, perhaps with a careful administration of mercury. Terson uses salvarsan when he wishes a particularly rapid effect, but otherwise prefers internal treatment and careful inunctions in children. He has instilled enesol with good results.

Darier treats the secondary and tertiary, as well as the parasyphilitic manifestations with salvarsan under the guidance of the Wassermann reaction. Rochon-Duvigneaud has had excellent results from neosalvarsan, which he thinks surer and quicker than mercury. CAUSÉ.

Neosalvarsan is the remedy of choice in the treatment of syphilis of the eye in any stage, according to FRADKINE (32, **Neosalvarsan in ophthalmic therapeutics**). A combination with mercury and iodide should be tried only after it has failed. He maintains that there is not a single case, to which objection cannot be taken, of neurotropic effect upon the optic nerve, and that all eye affections that appear after its use occur in spite of the treatment and not as a toxic effect of the neosalvarsan. A progressive sterilization can be reached by a long continuance of sufficient doses, and recurrences are due to faulty dosage, or too early an interruption of the treatment. Gradually increasing doses up to 1*ctg* per kilo have a better sterilizing effect than large single doses. The immediate and late evil results are due to various causes, such as anaphylaxis, Herxheimer's reaction, or a previously latent pathological condition. He has seen no cures from intramuscular and subconjunctival injections, they must always be intravenous.

CAUSÉ.

DARRIEUX (30, **Treatment of ocular syphilis with salvarsan and neosalvarsan**) reports his observations in about two hundred cases. He has seen bad accidents more often after the intravenous injection of salvarsan than after the use of neosalvarsan, but they were not dangerous in any. Salvarsan has the best effect upon the uveal diseases from a histological standpoint, on changes in the anterior segment from the anatomical, and in acute disease in the course of a fresh syphilis from a clinical. It produces improvement in only about half the cases of chronic iritis, and its effect is uncertain in choroiditis. A good effect had not been noticed on the corneal process in interstitial keratitis, but had been seen on the accompanying uveal symptoms. Retinal changes and tabetic symptoms on the part of the optic nerve or the extrinsic muscles were not influenced, while improvement had been obtained in syphilitic diseases of the nervous elements of the eye that were not of tabetic genesis. The mercurial treatment runs parallel to that with salvarsan, and the latter is to be preferred only in acute diseases; the hoped for sterilization of the organism has not been attained. CAUSÉ.

ZIELER (42, **Salvarsan and ocular troubles**) showed two patients that had been treated with iodide of potassium and salvarsan for syphilis or syphilitic tabes. They presented paresis of the oculomotorius and punctate hemorrhages in the region of the macula. It must always be borne in mind that in conjunction with vascular troubles salvarsan may favor the occurrence of hemorrhages, and that under such circumstances more than usual care must be exercised in the use of salvarsan. Such hemorrhages may easily escape observation as they are slight and excite subjective symptoms only when the macula itself is affected, as was the case in one of these patients.

RAUCH (36, **The influence of embarin in syphilitic affections of the eye**) finds that embarin is absorbed rapidly, does not usually cause a rise of temperature, and is painless. The lumps that occasionally appear in the muscles after intragluteal injection do not go on to abscess. He advises a slow treatment with small doses and a very strict care of the mouth.

IV.—METHODS OF RESEARCH, REMEDIES, INSTRUMENTS, AND GENERAL OPERATIVE TECHNIC.

43. BROCA, A., JOUAUST, DE LA GORCE, and LAPORTE. **Study of the new electric luminescent lamps and the action of extreme red and ultra-violet rays on the visual organ.** *An. d'Ocul.*, vol. cli., No. 4, p. 273.

44. SERGIEWSKY, L. **A new tonometer.** *Zeitschr. f. Augenh.*, April-May, p. 449.

BROCA, JOUAUST, DE LA GORCE, and LAPORTE (43, **Study of the new electric luminescent lamps and the action of extreme red and ultra-violet rays on the visual organ**) conclude that the mercury lamp is not inferior, from the hygienic point of view, to other sources of light. They insist that the bulb must be enclosed in a certain globe without which the light is too intense and causes at least irritation of the conjunctiva. The intensity of the so-called "Neon Lamp" could not be accurately measured; however, a point worthy to be mentioned is, that the visual acuity is higher in this than in any other light. The eyes seem to become less fatigued in the Neon light, a fact which is also peculiar to the mercury quartz lamps. Generally speaking, the monochromatic lights are more trying to the retina than the complex colored lights, a fact which is in agreement with what is known about the retinal sensibility.

SCHOENBERG.

SERGIEWSKY'S (44, **A new tonometer**) instrument consists of a glass prism with three concentric circles inscribed on its lower surface. When this prism is laid on the cornea the latter will be flattened and touch one, two, or three rings according to the condition of the tension. If the three rings are touched, the tension may be assumed to be normal; the lesser degrees of impression correspond to higher degrees of tension. The instrument is particularly useful for a rapid, approximate measurement of tension.

V.—ANATOMY, EMBRYOLOGY, MALFORMATIONS.

45. BEAUVIEUX. **Epithelial serous cysts of the iris.** *Arch. d'ophtalm.*, xxxiv., p. 193.

46. BERG, FREDERIK. **Unusually extensive medullated nerve fibers with high myopia and amblyopia.** *Klin. Monatsbl. f. Augenheilk.*, lii., p. 495.

47. BERGMEISTER, R. **Pigment anomaly of the iris.** *Ibid.*, p. 723.

48. BOEHM. **Congenital anterior and posterior synechiæ of the iris, with hydrophthalmos.** *Ibid.*, June, p. 841.

49. CALHOUN, F. P. **Bilateral coloboma of the lens.** *Ophthalmology*, April, 1914.

50. GAMBLE, W. E. **Albinism of the eyes without involvement of the hair or skin.** *Ophthalmic Record*, May, 1914.

51. LUNA. **Chondrisomes and retinal pigment.** *Arch. f. Zellforschung*, 1913, x., 3.

52. MATTAUSCHEK, EMIL. **Peculiar changes in the medullary sheaths of degenerated nerve fibers.** *Neurolog. Centralbl.*, 1914, No. 7, p. 403.

53. ROTH, H. and M. **Contributions to the pathology and pathogenesis of congenital coloboma of the eyeball.** *Arch. f. vergl. Ophthalm.*, ii., p. 129.

54. SAMUELS, BERNHARD. **Ectropium uveæ congenitum.** *Zeitschrift f. Augenheilkunde*, xxxi., p. 333.

55. TERRIEN. **Congenital cataract and remains of the pupillary membrane.** *Arch. d'ophtalm.*, xxxiv., p. 230.

56. WHITNALL. **The levator palpebræ superioris muscle. The attachments and relations of its aponeurosis.** *The Ophthalmoscope*, May, 1914, p. 258.

MATTAUSCHEK (52, **Peculiar changes in the medullary sheaths of degenerated nerve fibers**) found a very marked network on the nerve fibers in the neighborhood of a tumor of the fourth ventricle. The nerve fibers were swollen and presented spherical elevations with a conspicuous network of the medullary sheaths. The Weigert hæmatoxylin stain was used.

CALHOUN'S (49, **Bilateral coloboma of the lens**) first patient was a man of 61 having iridodonesis, mature cataracts, and defective projection. No abnormality of the lenses was noticed, but after the extraction he thought that he could determine a decided deficiency in the lower segment of each lens. The illustrations showing the lenses are not convincing. Another case showed four punched out places at the border of the right lens downwards and inwards, and an apparent marginal defect in the same position in the other eye. The third case had congenital coloboma of the iris and choroid, and a small amount of lens missing in the lower quadrant.

ALLING.

BEAUVIEUX (45, **Epithelial serous cysts of the iris**) observed a congenital serous cyst with an epithelial lining in a child 28 months old. The cyst was as large as a pinhead, situated on the anterior surface of the iris, and had been noticed by the parents immediately after birth. A malformation of the lower jaw consisted in the presence of the two middle incisor teeth. The cyst was removed and found histologically to belong to the rare epithelial variety. Trauma is excluded as the cause, and, together with the anomaly of the teeth, it is rather to be considered as a fetal fault of development. Perhaps it originated through a fault in the closure of the ocular cleft, in which some ectodermal cells became separated and developed later. The situation of most cysts, on the inner-lower part of the iris, favors this idea. In many cases the wall of the cyst has relations to the retinal portion of the iris, and then it may be supposed that we are dealing with remains of the sinus annularis. He inclines to Nadal's theory that toward the end of the first month of pregnancy certain cells of the ectodermal cell colonies that go to the formation of the lens become implanted on the anterior surface of the secondary optic vesicle and that then some later acting cause occasionally leads to the formation of a cyst.

CAUSÉ.

BERG (46, **Unusually extensive medullated nerve fibers with high myopia and amblyopia**) found in a boy 10 years old a deep funnel-like excavation at the place of the papilla, about which were medullated nerve fibers some of which covered the region of the macula.

Bergmeister (47, **Pigment anomaly of the iris**) found in a girl 8 years old a melanotic zone in the inner-upper quadrant of the iris that resembled an atypical coloboma. He took it to be an ectropium uveæ congenitum.

Boehm (48, **Congenital anterior and posterior synechiæ with hydrophthalmos**) examined histologically several eyes with troubles of this nature. In one there were signs of a fetal inflammation, during which he thinks that the iris was pressed forward and became adherent to the cornea. In two other cases he leaves the question open whether the synechiæ, anterior and posterior, should be referred to an inhibition of development and faulty separation, or to a secondary adhesion, but he is inclined to believe them to be due to fetal inflammation.

Gamble (50, **Albinism of the eyes without involvement of the hair or skin**) saw a child with nystagmus and albinotic eyes. There was, however, a slight amount of pigment in the irides. Pigment was otherwise normally present in the body. The vision was defective. Alling.

H. and M. Roth (53, **Congenital coloboma of the eyeball**) describe a case of coloboma of the iris, ciliary body, choroid, and intraocular end of the optic nerve, met with in a child 8 weeks old. A mesodermal ledge was demonstrable in the coloboma. The central vessels were lacking in the optic nerve; the fovea was normally formed; the sphincter was developed at an atypical place, apart from the iris; the retina presented duplicatures. Another case was one of coloboma of the iris, ciliary body, choroid, and intraocular end of the optic nerve in an adult. A third case was one of coloboma of the iris, choroid, and intraocular end of the optic nerve in an infant. The authors incline to think that the vascular mesodermal ledge, which was present in the coloboma in all three cases, forms a considerable interference with the closure of the optic cleft. No indications were found of a lessened tendency to grow on the part of the margins of the secondary optic vesicle.

Terrien (55, **Congenital cataract and remains of the pupillary membrane**) reports two observations that show a connection between congenital cataract and remains of the pupillary membrane. The first case presented an irregularly stellate anterior polar cataract, not pyramidal and not prominent, in the center of which pupillary threads were inserted that came from the minor circle of the iris. Such a cataract was present in each eye. Central delicate maculæ were to be found in the cornea, and in the region of an artificial coloboma of the iris there were traces of pigment upon the anterior capsule. The patient had had a severe purulent inflammation of both eyes after birth. In the second case both eyes had a punctate congenital cataract without ophthalmoscopic changes, complicated by the simultaneous presence of remains of the pupillary membrane and pigment spots on the anterior capsule of the lens. Perhaps both the cataract and the persistent pupillary membrane have the same etiology and are to be ascribed to a fetal inflammation. CAUSÉ.

SAMUELS (54, **Ectropium uveæ congenitum**) describes a case of this nature clinically and histologically. He regards the ectropium as a malformation and places the period of its origin in the third embryonal month. Twenty-four cases are collated from literature.

LUNA (51, **Chondrisomes and retinal pigment**) comes to the conclusion, from his studies of the embryos in various eggs, that the chondrisomes of the pigment epithelium of the retina are changed completely into pigment granules.

CALDERARO.

WHITNALL (56, **The levator palpebræ superioris muscle**) presents a careful study of the palpebral attachments of this muscle. In dissection of the eyelids, layer by layer, from the front, the usual description is that after the removal of the skin and orbicularis muscle, the tarsal plate is exposed. Whitnall points out that beneath the orbicularis muscle is a further layer of connective tissue which must be removed before the plate is exposed. This layer is continuous with the aponeurosis and is met by the septum orbitale. When reflected it exposes the tarsal plate and Müller's muscle. He also directs special attention to the relations, medial and lateral extensions, of the aponeurosis of the levator muscle. The lateral extension is anchored strongly into the margins of the orbit, and by ligamentous bands firmly attached to the lacrimal gland; it is continued over to be fixed into a tubercle of the malar bone just within the orbital margin opposite the outer canthus. It thus holds the lacrimal band in position and is capable of moving it. Sometimes there are lateral outshoots of the belly of the muscle itself into the gland. On the medial side the aponeurosis loses its tendinous nature and is traced with difficulty towards the medial palpebral ligament, and herewith the orbit and the tendon of the superior oblique above demark a triangular space through which orbital fat bulges (*bourrelet senile*) when, as in age, the orbicularis oculi loses its tone. CURRAN.

VI.—NUTRITION AND INTRAOCULAR TENSION.

57. HERTEL, E. **Experimental investigations on interdependence of ocular pressure and blood constituents.** *Arch. f. Ophth.*, lxxxviii., 2, p. 197.

58. HOROWITZ. **The relations between fluctuations of the eye tension and of the blood pressure in man.** *Physikalisch-medizin Gesellschaft in Wuerzburg*, June 25, 1914.

59. LAGRANGE, F. **On a method of raising the ocular tension.** *Arch. d'opht.*, vol. xxxiv., No. 6, p. 337.

HOROWITZ (58, **Relations between the fluctuations of the eye tension and of the blood pressure**) instituted a number of investigations that demonstrate very close connections between the blood pressure and the intraocular tension.

HERTEL (57, **Experimental investigations on interdependence of ocular pressure and blood constituents**) has tried to determine the influence of the composition of the blood on the intraocular pressure independent of the blood pressure. He has injected solutions of crystalline and colloidal substances into the blood of rabbits and has measured the intraocular pressure with Schiotz's tonometer in regular intervals. For the experiments with salts he has used mostly sodium chloride in solutions from 0.45–10%, sodium sulphate, phosphate, bicarbonate, acetate in similar concentrations, furthermore grape-sugar in 20–40% solutions, urea, gelatine, serum, egg albumen, etc.

The experiments showed that concentrations of the introduced saline solutions down to 0.017% of sodium chloride or isosmotic concentrations of the other substances lowered the intraocular pressure. The diminution as a rule began after five minutes and continued until the pressure was nil. Concentrations lower than those mentioned and distilled water increase the eye pressure. The experiments with sugar, urea, and the colloidal substances led to similar results. A change in the blood pressure was not responsible for these changes in the eye-tonus. The intravenous infusions influenced the blood pressure very little. Additional injections of adrenalin, which raised the blood pressure much, did not raise the lowered eye pressure. The changes found were due to the increased or lowered concentration of the blood. When the blood is highly concentrated, it will try to dilute itself down to the normal concentration by attracting fluid from the tissues. When the blood-concentration is lowered, it again will try to reach its normal standard by expressing fluid into the surrounding tissues. Low concentrations of the injected fluid increase the intraocular pressure. SCHIRMER.

LAGRANGE (59, **On a method of raising the ocular tension**) says that a subnormal intraocular pressure is detrimental to the proper nutrition of the organ and for this reason he recommends the superficial cauterization of the sclera all around the limbus in cases of detachment of the retina accompanied by a low intraocular pressure. He thinks that the use of the cautery results in the formation of a ring of connective tissue which compresses the eyeball and raises its tension. He reports two cases with glaucomatous manifestations on account of the thickening of the sclera following the excision of an epibulbar epithelioma in one case, and an accidental severe lime burn of the eyeball in the second case. These two histories tend to show—according to the author—that a thickening of the sclera may raise the ocular tension. He practised his operation, which he calls "Blindage de l'œil," in six patients with retinal detachment and invariably obtained a temporary increase of ocular tension, which, in the majority of cases, exceeded the normal limit. One case was a complete success: the retina became reattached.

SCHOENBERG.

(*To be continued.*)

CORRESPONDENCE.

Sept. 3, 1914.

Editor, Archives of Ophthalmology:

You were kind enough to publish in your journal, Volume XLI., No. 6, of 1912, "A Simplified Gram Technique." I have since found that many have tried this technique and did not get the results as stated. My own original bottle of the stain being exhausted, I procured some of the Methylviolet 6B, but found to my surprise that I was unable to duplicate the results during the experiments which led to the writing of the paper. I then procured another bottle, fresh from Gruebler, and was again unable to get the stain as it should be.

During a recent visit to London I asked Dr. Angus McNab, the translator of Axenfeld's "Bacteriology of the Eye," what the probable reason for this difference was, and he replied that he had had exactly the same experience,—that he had made up a stain with which he got the most ideal results, and much along the line of my technique, but after the original bottle of the powder was used he was unable to duplicate the solution, and he further stated that bacteriologists in Axenfeld's clinic have found that practically all these stains varied considerably in different bottles.

I feel therefore that it is only fair to myself and your readers to state that I have been unable to make a solution which will do what my original one did, and on which I based the article. However I am experimenting with some modifications and trust to be able to work out a solution with which this can be done at any time. Thanking you for printing this, I am,

Yours very truly,

Walter H. Snyder.

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ARCHIVES OF OPHTHALMOLOGY.

OBSERVATIONS ON THE TOPICAL DIAGNOSTIC AND PSYCHIATRICAL VALUE OF THE WILBRAND TEST WITH A NEW CLINICAL INSTRUMENT.[1]

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(*With two cuts in text and two figures on Text-Plate II.*)

FOR ten years following the original suggestion of the topical diagnostic possibilities of the hemianoptic prism phenomena by Wilbrand in 1899, little interest was taken in the question, as is evidenced by the lack of communications on the subject until that of Behr in 1909. Apparently it was the investigations of Hess, in 1907, on the allied subject of the hemiopic pupillary reaction which stimulated interest, for the two subjects have since that time usually been considered together.[2]

Wilbrand (12), in 1899, having become convinced that the Wernicke hemiopic pupillary reaction was a practical failure, decided that a new method to the same end was desirable, and proposed his hemianoptic prism phenomenon. With one eye covered, the hemianoptic patient was told to concentrate attention on a small white point on a black wall. A strong prism was then suddenly placed before the eye, throwing the image on the blind retina. If the eye instantly moved so as to fix on the point again, the lesion was central; otherwise it was peripheral to the basal stem ganglion. Likewise if the prism was suddenly interposed, throwing the image on the seeing retina, the eye instantly moved to fix the image again; but when the prism was suddenly removed the eye would once more jerk back to fix the point or not according as the lesion was central or peripheral. While he found positive or central cases verified at necropsy, he found no negative or peripheral cases. One case of acromegalic bitemporal hemianopsia failed to give the negative test, presumably, he thought, because there was some light perception left in the defective field. The test may be made binocularly in homonymous cases. Wilbrand himself did not argue the presence of a definite reflex arc in this phenomenon, but subsequent observers have postulated such an arc; for instance, Behr locates the afferent branch in Bernheimer's fibers, which are supposed to have about the same course as the pupillomotoric fibers.

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[1] From the surgical clinic of Prof. Harvey Cushing at the Peter Bent Brigham Hospital, Harvard Medical School.

Presented at the meeting of the Academy of Ophthalmology and Oto-Laryngology, Boston, Oct. 19, 1914.

[2] Thus both subjects were considered in our communication (9) of 1913. But this year the data and instruments have become too bulky for a single communication. The instrument here presented could not be satisfactorily transported and was reserved for this session. The new instrument for testing the hemiopic pupillary reaction has already been presented elsewhere (10).

In the latter part of 1906, Bielschowsky (4) reported a single case, that of an intelligent young girl with temporal hemianopsia in one eye and blindness in the other eye from a chiasmal lesion. Refixation was equally prompt on each side with 40° prisms.

Behr (1), in 1909, reported the Wilbrand test on twenty cases of hemianopsia, by the prism method, and found no reason to doubt the diagnostic value of the test. In the same year, Lenz (8), in an exhaustive study of the cerebral visual paths, reviewed the work of Behr, but ventured no opinion in the absence of sufficient pathological material.

In 1910, Krusius (7) examined four cases by the prism method and reached the conclusion that the test was of doubtful value. A little later in the same year, Köllner reported the Wilbrand test in nine cases of homonymous hemianopsia, all presumably of central origin. Binocular prisms of 15° to 30° were used. The considerable delay shown by these patients in refixing the object on the blind side led him to doubt the diagnostic value of the reaction. Jess (5), in 1912, arrived at the same conclusion from a study of three cases.

In my own study (10) of twelve cases, reported in 1913, I came to the conclusion that several important factors had not previously been sufficiently well controlled. When prisms are used, unless they are placed before the eye very quickly and carefully, the patient may note a slight movement of the test object, indicating in which direction the object has apparently been deflected. The position of the thick or thin edge of the prism may be associated by an intelligent patient with a certain position of the test object. But worse than this, the test object always returned to the center when the prism was removed, and had always been placed so as to refract in the horizontal plane, so that intelligent observation on the part of the patient could materially aid him on repeated trials. And queerly enough the crucial experiment had never been recorded of using a disappearing object and noting the action of the eyes when the object was simply lost from view and no stimulus was active in the blind field. This latter test threw considerable light on the intelligence of the patient as a complicating factor. To control all of these possible complications, from one to three small electrically lighted spots were used. These were invisible to the patient and could be moved into various planes and distances from the center. All could be turned on or off at will in any sequence. Although this method required the use of an assistant to move the lights into different positions—for the patient was to be entirely denied advance information as to where the lights would next appear—nevertheless very consistent results were obtained, and all for the most part cast great doubt on the diagnostic value of the Wilbrand test. However, it seemed possible that if the reaction times were carefully studied in a large number of cases with an elaborate apparatus meeting all the requirements, certain characteristics of the reaction could perhaps be found which would be of practical, or at least scientific, value. The apparatus previously used was somewhat difficult and time-consuming to manipulate and could be improved in certain features. Accordingly a new instrument was designed and built, with which a large number of patients could be easily and quickly examined.

THE NEW INSTRUMENT

In order to obtain displacements of the test lights up to 45° from the center and not vary this distance from the patient, a large awning or canopy umbrella, five feet in diameter when extended and built on a radius of one meter, was selected. This was painted black and mounted upon an adjustable stand. In order to present a smooth concave inner surface to the patient the center pole and bracing were removed and the umbrella was held open in a vertical position, as shown in the cut, Fig. 1, by guy wires running from each rib behind to a corresponding steel spoke extending from a forged central hub attached to the top of the adjustable stand. These spokes in addition support a board 12 inches wide by 14 inches long, which forms a central station for the wiring system. To this board are also attached a tin box containing three dry cells, a resistance coil, and an automatic magnet short switch. The latter is packed in a heavy felt covering to muffle any slight click that it may make.

From the central station a piece of rubber gas tubing 10 feet long, containing twenty-four wires for the necessary connections, runs to the portable switchboard, which has a simple push button key for each light and a resistance coil or rheostat for regulating the intensity of the lights. The central switch on the switchboard for controlling the central light on the umbrella is arranged differently than are the switches for the other lights. When it is released it springs upward and meets a contact point, lighting the central light directly until any other switch is closed, when its corresponding lamp will light and the central light in the same instant be automatically turned out. If the central switch is pushed down away from the upper contact the central light goes out. If now it is pushed still farther down, until it strikes the lower contact point, the central lamp is again lighted in the same way that the other switches light their respective lamps.

The wiring necessary to accomplish this control is schematically shown in Fig. 2. One side of each of the 19 lamps is connected to one side of the battery (B) after passing through the rheostat (R). The other side of each lamp is connected by respective wires to the contact point of its respective switch, Illustrating Dr. Clifford B. Walker's Article, "Observations on the Topical Diagnostic and Psychiatrical Value of the Wilbrand Test with a New Clinical Instrument."

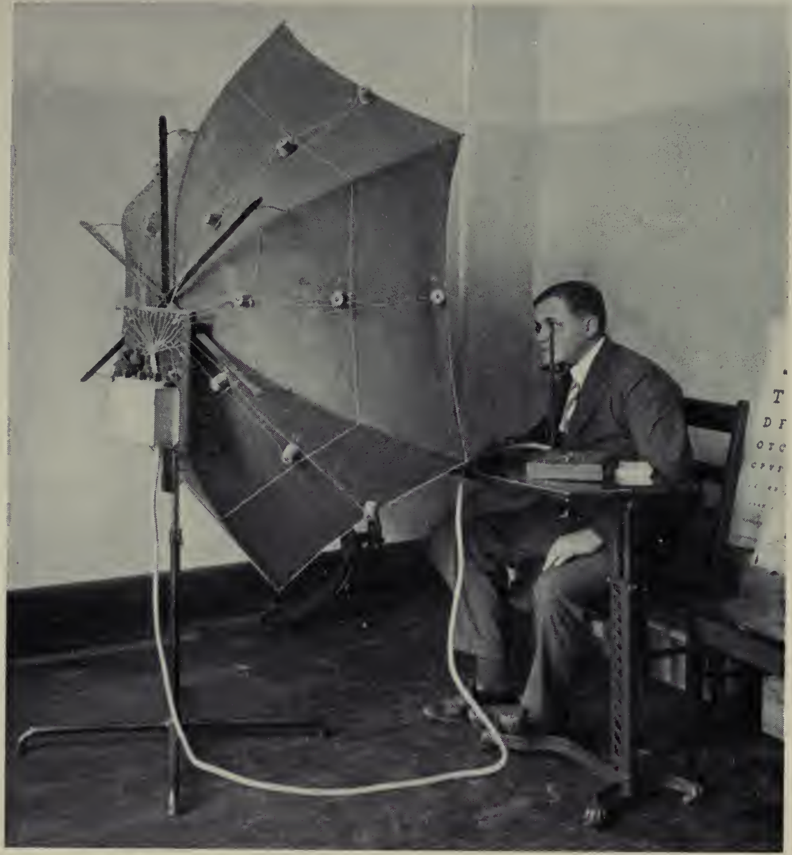


FIG. 1. Photograph showing general arrangement of patient in position to be examined with the new instrument. Apparatus is slightly turned to give better view.

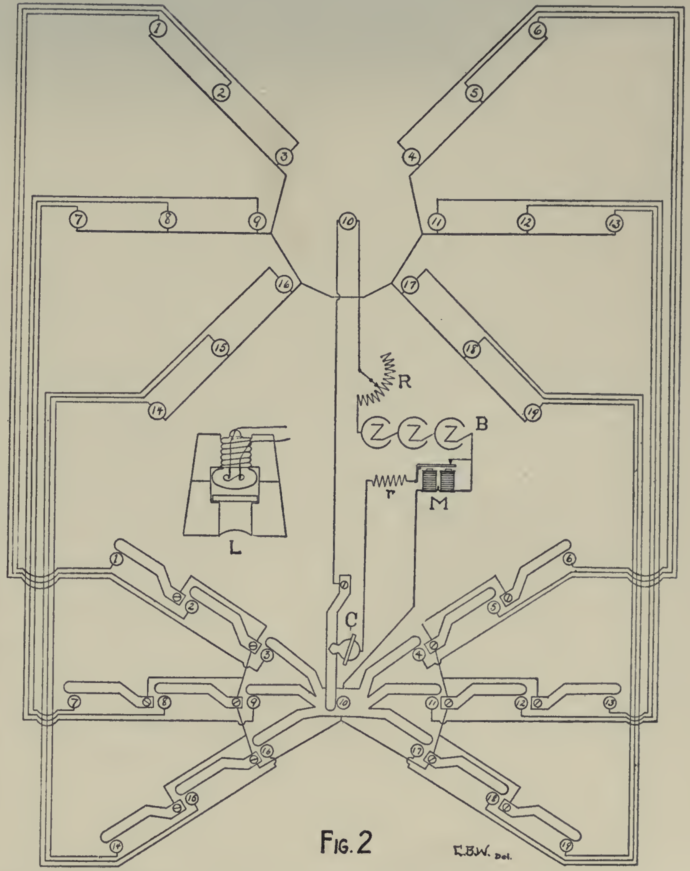


Fig. 2. Schematic diagram of arrangement and electrical connections in the new apparatus, (R) rheostat switchboard controlling intensity of lights; (B) battery; (C) movable contact-point; (r)

with the exception of the central light, which is connected to the opposite side of the central switch. The opposite sides of the remaining switches are connected together and to the magnet (M) and thence to the other side of the battery (B). The central switch may light the central lamp through two contacts. One contact (C), above, is connected through the resistance (r) and the armature of the magnets (M) to the battery (B), as shown in the cut. The resistance (r) is equal to that of the magnets (M), so that the light intensity is the same in either circuit. The contact (C) may be rotated to one side if its use is not required. The other contact (No. 10), below, lights the central lamp through the magnets as do the other switches.

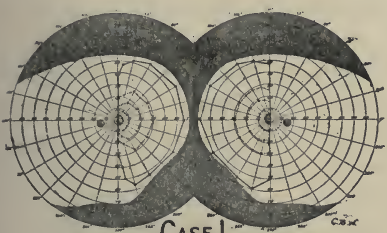
The operation of the lights by this arrangement is obviously simple. In the position shown in the cut, the central lamp only will be lighted, the current passing from the battery through the armature of the magnets and the resistance (r) through the contact (C) and the central switch to the central light and back to the battery through the rheostat (R). If now any other switch is closed the current shunts through the magnet (M), which draws down the armature, breaking the circuit of the central light, and at the same instant the whole current passes through the magnet around through the wires and lamp corresponding to the switch closed. If the switch is released the central lamp will again light as the magnet allows its armature to spring up to its contact point. If it is desired to turn out the central light momentarily the central switch is simply depressed until contact with (C) is broken. Further pressure will relight the central lamp as the switch touches contact point No. 10. If any other lamp is burning and it is desired to turn it out without lighting the central lamp, either the contact (C) may be rotated to one side or the central switch may be pressed down, out of contact, and the switch corresponding to the lighted lamp released. But if we do not wish the center to be relighted each time but wish to change the light to various parts of the field, the contact (C) is turned to one side and each switch lighting a lamp is released as the next one is depressed. In this way displacements up to 90° may readily be obtained.

The lights controlled in this manner are arranged on the umbrella in the horizontal line and in the two lines at 45° with the horizontal passing through the center. There are three lights distributed along each line from the center, so that displacements of 15°, 30°, and 45° may be obtained in each direction from the center when the patient is seated one meter from center. The lamps (2½ volt, tungsten) are set in a large cork, as shown in (L) of Fig. 2. The cork was first cut perpendicular to its axis through the central point. Each half was then bored from each end with different-sized cork borers until a cross-section, such as is seen in the cut, was obtained. The lamp, with wire connections soldered on, was then screwed into the upper segment and a disk of milk glass fitted into the lower segment, as indicated in the drawing. Each lower segment was then glued in place on the back of the umbrella and a hole burned through the cloth with a red-hot iron rod corresponding to the hole in the cork, at the same time blackening the inside of the cork. The milk glass disk was then placed in position and the upper segment containing the lamp was glued in place over the lower segment. The purpose of having the light surface thus set at the bottom of a black tube about 1*cm* in depth is to render it entirely invisible to the patient in semi-darkness, except when illuminated.

For convenience in manipulating the lights the switchboard was made about the same size as a field chart and the keys were arranged in the same relative position and order as the lights on the umbrella. In this way the keyboard may be operated with one hand entirely by touch, and undivided attention may be given to observing the timing the movements of the patient's eyes.

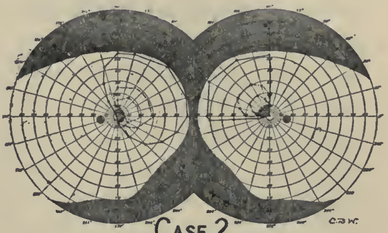
METHOD OF EXAMINATION.

Since we are studying a reaction which is supposed to have characteristics of a more or less involuntary or subconscious nature, it is obviously necessary to eliminate as far as possible thoughtful and voluntary processes. To get the particular mental repose which would be ideal for these examinations is very difficult, if not impossible. It is not desirable to instruct the patient as to the method and rationale of the examination, and yet this very ignorance of the procedure has often been noted to make the patient fidgety and querulous in regard to what is taking place, at a great expense to his mental repose. Difficulties of the following sort arise. The patient has had several fields taken and possibly other examinations requiring rigid central fixation, no matter what takes place in the peripheral field. Now we do not wish the patient



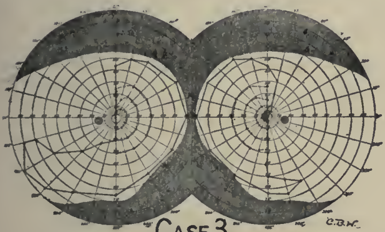
CASE I.

Chiasmal lesion
V.O.D. $\frac{20}{70}$; V.O.S. $\frac{20}{70}$+.



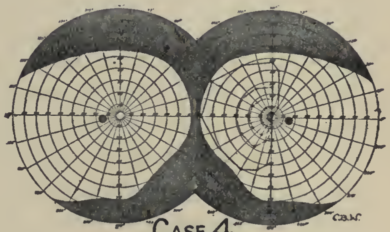
CASE 2.

Chiasmal lesion
V.O.D. $\frac{16}{200}$; V.O.S. $\frac{20}{100}$.



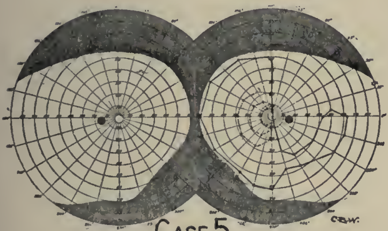
CASE 3.

Chiasmal lesion
V.O.D. $\frac{20}{200}$; V.O.S. $\frac{20}{30}$.



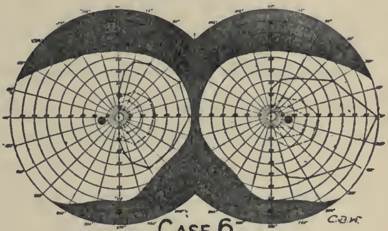
CASE 4.

(Surgical No. 789.)
Pituitary tumor
V.O.D. $\frac{20}{40}$; V.O.S. nil.



CASE 5.

Chiasmal lesion
V.O.D. $\frac{20}{30}$; V.O.S. nil.



CASE 6.

Tract lesion
V.O.D. $\frac{20}{40}$; V.O.S. $\frac{20}{30}$.

FIG. 3. Typical fields of anterior cases examined. The history and examination for Case 1 is given in the text, but for the other cases only in the *Transactions*.

to stare willfully in one direction in this examination, nor do we wish to suggest that the field be deliberately searched for the test object in case it should disappear. The examination should not be attempted on the same day that a field or other test requiring central fixation has been made, and preferably should be made in another room, to dissociate as much as possible from the idea of perimetry. But even at best the patient, if intelligent, rapidly becomes familiar with the procedure as it is repeated, markedly reducing the refixation time, and finally as facility increases may become interested and amused at the "hide-and-seek" element of the examination. Thus it becomes necessary to conduct the examination in two stages. In the first stage the patient is given as little instruction as possible and is quietly seated before the instrument, without unnecessary distractions of any kind. He is simply told to observe the light wherever it may be. The automatic return to the central light is used only at intervals, since there is a marked tendency on the part of the patient to look back to the center if it is used continuously. At the end of the first stage (five to ten trials) he usually begins to show a greater or less decrease in reaction time, or if he is not very intelligent further instructions are necessary to gain a better state of mental repose.

In performing the tests the patient is seated at a distance of one meter from the center of the apparatus. While a chin-rest is not necessary, it reduces the tendency to turn the head with the eyes, thereby making observations of ocular movements easier. There should be dim room illumination, just sufficient to show clearly the movement of the patient's eyes. This illumination is from a rheostat ceiling light just out of the patient's peripheral field of vision above. Observation of ocular movements may be made with a short focus telescope or by the unaided eye. No difficulties are presented either way. The intensity of the test lights is regulated by the rheostat to the point where no sense of dispersion light is obtained when its image is made to fall on the normal blind spot. Such an intensity of illumination, while greater than that of a white spot on a black wall, still offers no indication by dispersion sheen to the hemianoptic patient of its location when it is in the blind field. In case there is a relative central scotoma the examination can usually still be made if there is vision in the neighborhood of $\frac{20}{200}$, by increasing the light intensity somewhat, since with macular damage the sensitiveness to dispersion light is not so acute.

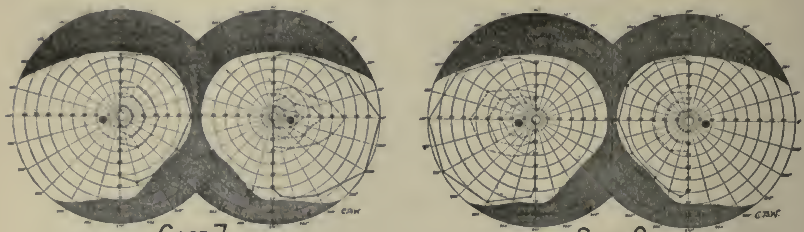
For rapid and accurate manipulation of the lights with respect to the field of vision a copy of the field may be held close at hand, or the field outline may be lightly chalked on the black top switchboard for each eye, so that one may simply press a key in a certain part of this charted field and a light will appear in the corresponding field of vision of the patient. When the reaction runs over a second it should be timed with a stop-watch. If the reaction time is less than a second, a system of counting, carefully practised, is more satisfactory.

In taking the end point of the reaction time it has been found much better to watch the eye come to rest rather than to ask the patient to say some such word as "Now" when the light is located, because the patient seems to feel more under strain of examination with this added requirement and is apt to put much more willful effort into locating the spot, immediately showing an exaggeration of the tendency to seeking movements.

Prisms have not been used, for several reasons: (1) The patient may get an inkling as to which way the image is going to be refracted as it travels the edge of the prism, or (2) by associating the thick edge of the prism with a certain position of the image. (3) He may see certain portions of the room through the prism which form orientation marks as to the position of the light. (4) If the prism is held close to the eye, the refraction prevents accurate observation of the eye movements. (5) If the prism is held forward far enough to observe the eye directly, the patient may get either orienting or disorienting glimpses of the room around the prism margin.

Previous experience with these tests having shown that the reaction time decreased after the first few trials, or as soon as the patient became familiar with the general procedure, it became necessary to proceed with the simpler tests first and with these confined to the blind side, for if the light is first changed from the center to the seeing side, and then disappears in the center to appear on the blind side, the natural conclusion is that it must be in that side since it is not in the seeing field.

Therefore the 15°, and then the 30° and then the 45° displacement horizontally is tried on the blind side. The center light is now simply turned out and no light appears on the blind side. Sometimes the latter test may be made first. From this point on, the order is not of importance, and a great variety of trials may be carried out in any order.

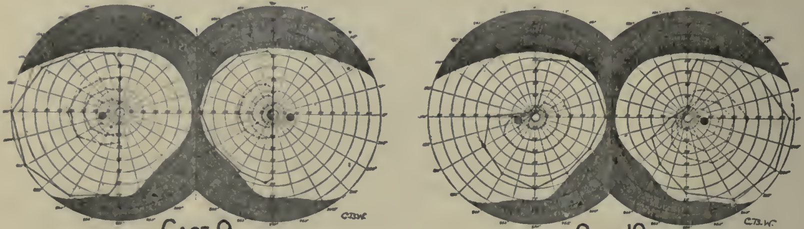


CASE 7.

Right parietal tumor
V.O.D. $\frac{20}{20}$; V.O.S. $\frac{20}{20}$.

CASE 8.

Posterior lesion
V.O.D. $\frac{20}{20}$; V.O.S. $\frac{20}{30}$.

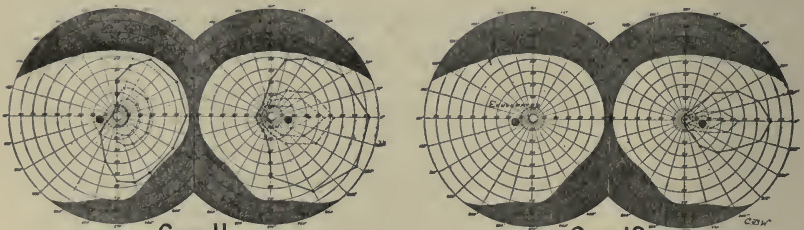


CASE 9.

Left posterior lobe tumor
V.O.D. $\frac{20}{200}$; V.O.S. $\frac{20}{30}$.

CASE 10.

Temporal lobe tumor
V.O.D. $\frac{20}{30}$; V.O.S. $\frac{20}{30}$.



CASE 11.

Gliomatous cyst right parietal lobe
V.O.D. $\frac{20}{20}$; V.O.S. $\frac{20}{20}$.

CASE 12.

Right temporal lobe tumor
V.O.D. $\frac{20}{20}$; V.O.S. nil.

FIG. 4. Typical fields of posterior cases examined. The history and examination for Case 7 is given in the text, but for the other cases only in the *Transactions*.

The method of recording results must be as simple and rapid as possible. Probably the best way is to record the lights by numbers. The patient's chart is outlined on the keyboard. Each key is given a number, which is easily remembered. The displacement is then recorded by the first two numbers and the time by the third number, followed by remarks on the character of the reaction. Record is kept of the reaction time on the blind side only, since the reaction time on the seeing side is very constant and very short, usually in the neighborhood of one-fifth of a second or less. Before proceeding with the examination the field chart is studied and a large series of numbers, indicating desirable displacements, are put down in columns, so that on observation merely the reaction time and occasional remarks need be recorded.

CASE REPORTS.

In all, 26 cases have been examined for the Wilbrand reaction by the electric-light method. The space and figures necessary for the report of all these cases would hardly be justified by the results. Therefore, instead of reporting several cases of similar field type and reaction only one typical case is given. The fields were all taken with the instruments and in the manner previously described in another paper.[1] Only the field for the normal disk is given, since outside of this periphery the test lights are not visible unless close enough to the line of cleavage to be detected by dispersion light.

In the group of anterior lesions the cases naturally fall into three sub-groups, according to the character of their field defects: First, those with complete, incomplete, or more than complete bitemporal hemianopsia; second, those with no vision in one eye and complete or incomplete or more than complete temporal hemianopsia in the other; third, homonymous hemianopsia of tract origin. In the group of posterior lesions, subdivision may be made into complete and incomplete homonymous hemianopsia and cases with loss of vision in one eye and nasal hemianopsia in the other eye.

Certain definite types of refixation movements of the eye have been noted in most of these cases. These have been given terms such as pseudo-refixation, central refixation, pseudo-central refixation, angular refixation, and pseudo-angular refixation, which will be described in the somewhat more detailed summary of results given with the first case so that thereafter unnecessary and tedious descriptive accounts may be avoided.

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[1] Walker, C. B. "Some New Instruments for Measuring Visual-Field Defects." ARCH. OF OPHTH., 1912, xlii., No. 6.

Case 1. (Surgical No. 435).—Hypophysial struma. September 27, 1912. Mr. H. C. N., aged 42. Failing vision for two years, associated with frequent headaches, diplopia, nausea, and vomiting. Complete bitemporal hemianopsia for over one year. Examination on admission, typical hypophysial struma with evidence of neighborhood disturbances. Well educated professional man. Mental lethargy apparently slight.

Eye Examination. No nystagmus or exophthalmos. Transitory weakness of third nerve with pupillary reaction to direct light on right. Consensual reaction from left eye good. Left pupil reacts well to direct light. Hemiopic pupillary reaction marked by rotary shutter test. Right pupil 3.5*mm* diameter, left 4.5 *mm* diameter in ordinary light. Field and vision, Figure 3.

Wilbrand Test.—O. D.: When pseudo-refixation was attempted on the first trial the patient continued to stare at the center for six seconds, then gave a quick glance toward the blind side, and then announced that the light was out. On the next trial the 15° light was flashed as the central light was turned out. The patient continued to look at the center for four seconds and then gave a quick glance toward the blind side as before, but discovered the light this time and refixed on it immediately. Trying now the 30° displacement, the patient immediately looked to the previous displacement and then with a process of seeking found the light. Reaction time two seconds. When the 45° light was tried it was found by the same process in three seconds, and on repetition in two seconds. Patient was apparently familiar with the reaction. A light was displaced to 30° on the seeing side. Instant refixation, but when it was turned out and the 15° light on the blind side was lighted, the patient's eye instantly sought the center and searched for three seconds before the light was located on the blind side. This we have called pseudo-central refixation. The same thing occurred when no light at all was flashed on the blind side. Pseudo-refixation in the horizontal was now marked but rapidly performed, the patient being confident that no light was present in from two to three seconds. Displacements in the 45° axis above or below the mid-line gave what we have called angular refixation—that is, the eye looked out along the horizontal axis to the blind side until the light was discovered above or below, when it was instantly refixed. The reaction times did not measurably exceed those for the horizontal line, but became reduced on repetition to one second or less for the 15° displacement, to two seconds for the 45° displacement. At first there was a marked tendency on the part of the patient to look at the point where the light had last appeared on one axis and then up or down to the point where it actually was on the other axis. There was no tendency to look directly at the light until several trials, when the patient began to show considerable anticipation of the probable point of next appearance of the light instead of looking at the previous point. Pseudo-angular refixation was now present to a marked degree. That is, when the fixation light was turned off, the eye moved to fix a point on one axis and thence to another point on another axis.

O.S.: The first few tests on this eye were interesting, in that the results were obviously complicated by the experience obtained from examination on the other eye. Thus, when pseudo-refixation was first tried the patient immediately began to search over his seeing field—that is, this eye moved to the same side as before when the light disappeared. The patient evidently then realized his mistake and searched his blind field. This, however, occupied only five seconds before he announced that there was no light. Subsequent waverings toward the seeing side were noted, but the reaction time in the course of two or three tests was the same as in the other eye in the second stage, with all the phenomena present previously described.

Four other cases (S. Nos. 28986 and 29117, J. H. H., and 2 P. C.) with this stage of field defect have been examined, with practically the same result. Those with better central vision refix slightly more rapidly and those with more sluggish cerebration react more slowly. All showed the same type of refixation and pseudo-refixation.

The remaining case histories and examinations of the anterior group may be found in the *Transactions* of the Academy of Ophthalmology and Oto-Laryngology, 1914. The fields for these cases may be seen in Fig. 3 together with that of the above case.

Case 7 (Surgical No. 397). Right parietal lobe tumor. September 15, 1913. Mrs. C. R. C., aged 44. About eight months ago left homonymous hemianopsia developed and escaped detection until complete. Later headaches. Choked disk (3½ D.), anæsthesia and weakness of left side of body, dizziness, Babinski, etc., led to diagnosis of right occipital lobe tumor with cerebellar neighborhood signs. Right subtemporal decompression June 10, 1913. On September 21, 1913, a large tumor was successfully removed from the right parietal lobe by Dr. Cushing. Mental condition excellent throughout.

Eye Examination.—Both eyes: no exophthalmos; movements free and complete; no nystagmus; media clear. Fundi show typical picture of receded choked disk of low grade after decompression. With no central scotoma and good macular vision, the left pupil (5*mm* diameter) was definitely larger than the right pupil (4*mm*) in ordinary illumination. Good reaction to direct and consensual light, slight reaction to accommodation. Hemiopic reaction present in both eyes. Fields and vision, Figure 4.

Wilbrand Test.—O. U.: When pseudo-refixation was tested at the first trial, the patient was noted to search about the center with wider and wider swings toward the blind side until at seven seconds, with a glance out to about 50° she said she thought the light was not working. The 15° displacement was refixed in two seconds, with the same sort of seeking movements as in the first test. The 30° light was refixed by a further seeking motion in three seconds. With the 45° displacement, however, the patient looked out almost far enough, then moved the eyes back to the 15° and 30° region, then up and down, and then announced that the light was out again. On repetition, however, it was found in three seconds, with a more rapid seeking motion, out on the horizontal axis. Pseudo-refixation test produced the same movements again, slightly more rapid. Angular and pseudo-angular refixation were rapidly performed now. The light was either found or called out in from one to two and a half seconds in any position. Central and pseudo-central refixation were readily demonstrable.

Three other cases (Surgical Nos. 29996 and 30418, J. H. H., and Surgical No. 1464, P.B.B.H.) have been examined, with practically the same results, though the reaction times were, if anything, not quite so short.

As with the anterior group, only one case in the posterior group can be given in detail as above. While the fields of the remaining cases may be seen in Fig. 4 together with that of the given case, the histories and examinations must be looked for in the *Transactions* of the Academy of Ophthalmology and Oto-Laryngology, 1914.

SUMMARY.

From a study of our series of hemianoptic cases with this instrument many interesting though not practical characteristics are notable. Thus it is notable that certain factors may increase the reaction time in any case, and that the presence of a relative central scotoma may add two or three seconds or more to the horizontal reaction time but does not contribute to much delay in the angular reaction time, perhaps because the peripheral retina along the cleavage line sees the light first, after which direct fixation is very rapid. Again, the reaction time in all cases is increased by introducing variations from simple horizontal displacements, such as angular displacements, change of center, and the introduction of pseudo-refixation tests. Further, any patient with a very poor memory or with depressed thinking or reasoning power shows an increased reaction time. On the other hand, in all cases the reaction time for any displacement may be markedly decreased on repetition, no matter in what way it is made. Also, in this group patients with bright mentality and good central vision always gave the shortest reaction time. In all cases there is a decrease of reaction time with the increase of the displacement, but on account of the decrease of reaction time occurring with repetition it makes a difference in what order the displacements are made. Thus if the small displacement is made first, difference in time reaction is not nearly so marked as when the larger displacements are made first. For this reason it seems fairer to time the small displacements first.

Regarding the phenomena of pseudo-refixation, certain general statements applicable to all cases may be made. If the pseudo-refixation test is the very first test made, the results are quite variable, but at any time later in the trials the results are very constant. When it is the first test, the patient may simply stare at the point where the light disappeared for from five to ten seconds, give a cursory glance onto the blind side, and then announce that the light is out. The more thoughtful group may at once begin to search the blind field over for the light and then give the seeing side a glance before they announce that the light is out. At any time after the first test made on the blind side, the patient almost invariably looks to the point on the blind side, where the light was last seen, when the fixation light is simply made to disappear without appearing elsewhere in the field.

Besides the simple forms of pseudo-refixation we can also elicit combinations and complex forms depending on the mental characteristics of the patient. Thus, after refixation has been performed on the blind side in any axis, and on the next trial another axis is used, the eye turns with more or less of a searching motion to the point where the light was previously seen, and then jerks upward or downward to refix the light in its real position as a glimpse of it is caught at some point on the line of cleavage between the blind and the seeing retina. This phenomenon we have called *angular refixation.* It is obviously a combination of pseudo-refixation and real refixation. Again, if the patient has refixed several times from a certain fixation point onto the blind side, and then instead of returning to the fixation point we use a light still farther out on the blind side, the patient's eye will often be noted to seek the center again before searching the blind field for the light. This we have called *central pseudo-refixation.* This lighting of a light one step farther out on the blind field each time is very confusing to a patient, especially if we change the axis, and there is always at first a tendency to pseudo-central refixation, which in this series decreases on repetition. If after this sort of test we refix the eye on the center and then turn the fixation light out, we may often note, particularly with the more intelligent patients, what we have called *angular pseudo-refixation*—that is, the eye is seen to move out along some axis to the point of a previous light, and then at an angle still farther out and on another axis, to the point of another previous light. A very intelligent patient usually at about this stage develops a seeking method of beating the game by a systematic search each time the light disappears, in one of two ways—either by moving the eye quickly onto the horizontal axis until the light is or is not discovered above or below, or by a circular motion sweeping the periphery of the blind field each time it is necessary.

It is notable in these cases that the reaction times in anterior lesions, producing homonymous hemianopsia or blindness in one eye and hemianopsia in the other, are of very much the same degree of magnitude as found in posterior cases, provided mental conditions and central vision are about the same in the two groups. But the reaction times in anterior lesions producing bitemporal hemianopsia may be somewhat greater at first than in lesions, either anterior or posterior, producing homonymous hemianopsia.

In explanation of these findings, however, several factors, independent of the supposed reflex arc, must be considered. Posterior cases have usually acquired rapidly a rather sharp homonymous hemianopsia but with retention of good central vision. These cases have every incentive to learn rapid refixation; objects moving onto the blind field may be plainly seen and followed. Thus the patient naturally develops the habit of looking onto the blind side for objects which have disappeared. This ability of refixation apparently develops according to the mental ability of the patient. The only anterior lesions which could be fairly compared with this group are the rather rare cases of tract lesions giving homonymous defects, and the hypophysial lesions producing blindness in one eye and temporal hemianopsia in the other. Even in these two groups the central vision and the patient's mentality must be on a par with the central vision and mentality in the posterior case to which it is to be compared.

Hypophysial cases having a bitemporal hemianopsia form by far the largest group of anterior lesions. These cases, in binocular vision, have each defective field largely supplied by the good nasal field of the other eye. They have then an effective field of vision extending about 60° from the fixation point in all directions. Accordingly they do not ordinarily observe moving objects disappear on passing to one side of the fixation, and therefore acquire no experience or habit of refixation. It is only in case vision in one eye is entirely lost that they gain such experience. Even with a large central scotoma in one eye, they do not become comparable to cases with complete homonymous hemianopsia, although they do acquire a certain amount of refixation ability. In addition to these considerations it must be remembered that hypophysial cases are suffering from a glandular disorder which produces not infrequently a mental as well as physical weariness. But even with all these handicaps, cases of bitemporal hemianopsia commonly reduce their reaction times markedly in the second stage of the examination, until they compare very favorably with homonymous cases. Further it may be noted that even in these cases the influence of observation and experience such as is obtained from the examination of the first eye is shown in the examination of the second eye, as a tendency, on the first test, to search in the wrong direction for the light that has disappeared. That is, the second eye is moved in the same direction as the first eye until the patient becomes aware or thinks of the different relation of blind and seeing field in the second eye.

When we compare posterior cases of homonymous hemianopsia with anterior cases of homonymous hemianopsia (tract) and with hypophysial cases blind in one eye and hemianoptic in the other, we find that their reaction times compare very favorably in all respects, even if no great allowance is made for the presence of central scotomas and mental conditions.

After studying the time and character of the reactions in all cases examined, we believe that while the test may be of value to a psychiatrist as a measure of a certain mental capacity, it is of no diagnostic importance in the localization of brain lesions. We now feel certain that phenomena which we have called pseudo-refixation, angular refixation, pseudo-angular refixation, the tendency to central refixation, and pseudo-central refixation, and the marked seeking character of all refixation on the blind side, in all cases indicate the functional result of thought and memory processes rather than a reflex action. It seems to me quite possible that this test could be made available for the armamentorium of the psychiatrist. An instrument as elaborate as the one herein presented would not necessarily be required. One with smaller lights, no larger than an ordinary hand perimeter, could be constructed for portable purposes. One central light and two or even one light on the arms, all movable, could be operated by a battery handle and finger switch so as to give essentially the same tests as herein described. From this standpoint possibly the psychiatrist would be able to give a better idea of the region of the lesion than would the ophthalmologist. Certainly we hope this may be the case.

CONCLUSIONS.

I. The distribution of field defects in anterior and posterior lesions encourages psychological factors, which greatly complicate the Wilbrand test.

II. The tendency to decrease the reaction time on repetition; the presence of seeking movements of the eye at all times during refixation; the presence of pseudo-refixation, angular refixation, pseudo-angular refixation, the tendency to central refixation, and pseudo-central refixation, all invalidate the Wilbrand test as a topical diagnostic reflex.

III. The results obtained by the Wilbrand test are surely a measure of certain processes of observation, memory, and thought, and are not an indication of the integrity of a definite reflex arc.

IV. The possibility that this method of examination may be useful to the psychiatrist and thereby, perhaps, contribute to topical diagnosis, is suggested.

I am deeply indebted to Prof. Harvey Cushing, not only for kindly facilitating this investigation, but also for generously allowing me the privilege of presenting this particular phase of his cases.

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HISTOLOGICAL FINDINGS AFTER SUCCESSFUL SCLEROSTOMY.

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(*With three figures on Text-Plate III.*).

ALTHOUGH during the past five years sclerostomy[1] for the relief of glaucoma has been widely performed, few cases have been reported in which the eyes have come to microscopic examination, and most of these, naturally enough, have been unsuccessful cases. In fact, only three eyes successfully operated upon by this method seem to have been examined. Two were briefly described by Holth (3), the other by Bachstez (4), and all three eyes were removed after death. In the case here reported, the eye was removed during the life of the patient on account of a small intraocular sarcoma, and was therefore free from post-mortem changes.

Case.—Emil J., aged 30 years, was admitted to the Massachusetts Charitable Eye and Ear Infirmary May 21, 1914. He stated that at intervals he had suffered slight pain in the left temporal region for about a year. Four days before admission he had noted for the first time that the vision of the left eye was much impaired. There seemed to be a cloud before the eye, and at this time there was considerable pain in the eye itself. The pain had diminished (under miotics) but vision had remained blurred.

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[1] This term (1) first suggested by me in 1910, seems to have met with considerable favor. Objection has been raised to it by Hay (2) on the ground that it is not strictly analogous to such terms as gastrostomy, enterostomy, etc. Such strict analogy seems to me unnecessary. A more valid objection is the fact that the opening is not confined to the sclera, but on the inside of the eye passes through the cornea. The term, however, is certainly preferable to "trephining" since the operation is not necessarily done with a trephine.

On examination the right eye was found normal, with a tension of 20*mm* (Schiotz). The left eye was moderately congested and the cornea decidedly hazy. The anterior chamber was not apparently shallow and showed what was supposed to be a small hyphæma. The pupil was dilated and somewhat eccentric. The fundus could not be distinctly seen owing to the corneal haze. The tension was 60*mm;* the vision $\frac{20}{200}$.

On May 24, 1914, sclerostomy, combined with a large buttonhole iridectomy, was performed by Verhoeff's method. The conjunctival flap was made large, and the incision made almost parallel to the limbus as recommended by Elliot. The episcleral tissue was excised from a small area at the site selected for the scleral opening. Atropine solution was instilled immediately after the operation.

Following the operation the anterior chamber became fully reëstablished in less than a week, but at the end of the week it became abolished again and the eye became very soft. Ophthalmoscopic examination now showed a large separation of the choroid on each side. These disappeared in about a week, the anterior chamber became reëstablished, and the tension of the eye became normal. A definite bleb was formed at the site of the sclerostomy. The patient was then discharged to the Out-Patient Department, eighteen days after the operation. About a week later it was noted that the supposed hyphæma had increased in size and was distinctly blackish. Sarcoma of the ciliary body was strongly suspected, but ophthalmoscopic examination and transillumination were still negative. The tension was still normal. Atropine was discontinued.

Three weeks later the mass at the bottom of the anterior chamber was larger, and ophthalmoscopic examination showed the edge of a dark mass at the extreme periphery of the fundus below. Transillumination now gave a definite shadow. The diagnosis of sarcoma of the ciliary body was made and enucleation advised. The eye was free from congestion and showed a well-marked translucent bleb above the site of the sclerostomy. There was slight cupping of the disk on the temporal side only. The visual acuity was $\frac{20}{100}$ and the visual field contracted, the limits being, with a .5*cm* disk, 35° inward, 35° downward, 40° upward, and 70° outward.

Retinal hemorrhages were observed after the sclerostomy, but the exact time when they were first seen was not noted.

Enucleation was performed July 15, 1914, seven and one-

ILLUSTRATING DR. VERHOEFF'S ARTICLE ON HISTOLOGICAL FINDINGS AFTER SUCCESSFUL SCLEROSTOMY

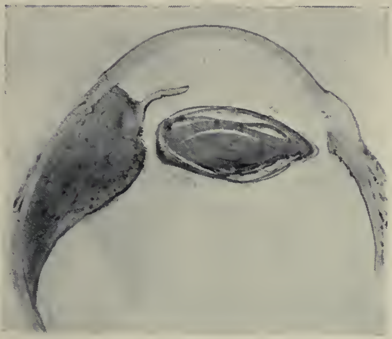

FIG. 1.—Showing the sarcoma of the ciliary body, only the margin of the scleral fistula is included in the section, but the overlying "bleb" is well shown. Photo x 3.

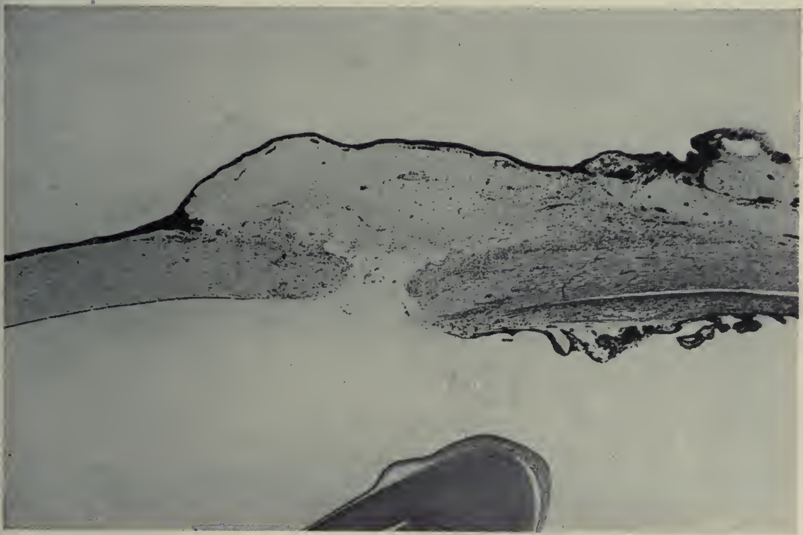

FIG. 2.—Section passing through about the middle of the fistula. Note the delicate tissue partly filling the latter. The larger black dots within this tissue are sarcoma cells. Photo x 18.

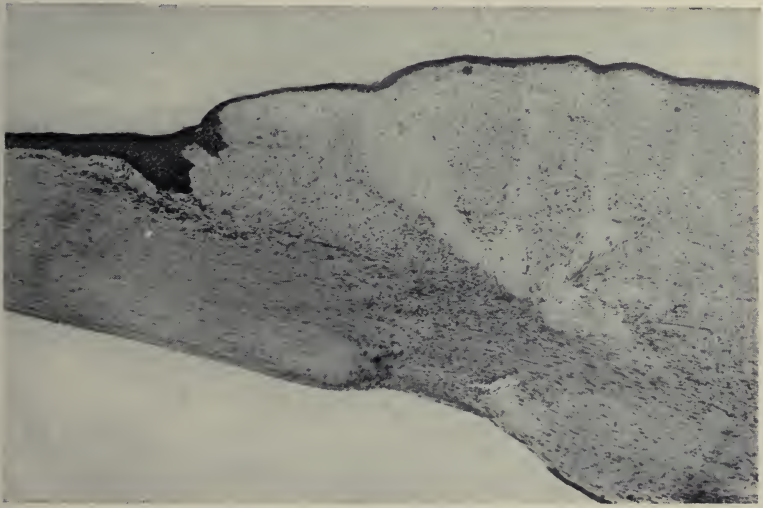

FIG. 3.—Showing large space in "bleb" extending up immediately beneath the epithelium. The section passes through the margin of the fistula and thus shows the tissue proliferation that has occurred in its wall. Photo x 50.

half weeks after the sclerostomy. Care was taken not to traumatize the bleb and to leave a considerable margin of conjunctiva intact around it.

PATHOLOGICAL EXAMINATION.

Macroscopical.—The cornea is clear. The anterior chamber, of normal depth, is free from coagulum. The lens is indented by the tumor and pushed slightly upwards. The iris shows a large buttonhole beneath the site of the sclerostomy. There are no posterior synechiæ.

The diameter of the bleb over the scleral fistula is 3*mm*. The retina shows numerous hemorrhages, most of them small and punctate. Anterior to the equator some of them are 2*mm* in diameter. The choroid and retina are *in situ*.

Histological.—Fixation in formalin followed by saturated solution of potassium bichromate. Celloidin embedding. Serial sections through sclerostomy opening. Longitudinal sections of optic nerve and disk nearly to central vessels. Serial cross-sections of central vessels.

The tumor (Fig. 1) is found to be a moderately pigmented, actively proliferating spindle-cell sarcoma. It entirely replaces the ciliary body below, and has destroyed the ligamentum pectinatum here, extending over the posterior surface of the cornea for about 1*mm*. It has pushed the root of the iris away from its normal position, thus increasing the depth of the anterior chamber here to 1*mm*. Posteriorly the tumor gradually loses itself in the choroid. The ciliary epithelium and the pigment epithelium of the retina are for the most part still present over its surface, though greatly altered, but in places the pars plana has been broken through and the bare tumor projects slightly into the vitreous chamber. The ciliary processes have not been invaded but are compressed against the lens by the tumor. The sclera is slightly invaded along some of the perforating vessels, and in places foci of tumor cells are seen around vessels in the episcleral tissue. Along the sclera the tumor shows old areas of necrosis markedly infiltrated with fatty endothelial cells, and containing cholesterine crystals surrounded by foreign-body giant cells.

The cornea is normal. The iris shows slight fibrosis and slight ectropion uveæ. The cut edges of the iridectomy wound in some places are not healed over, the stroma here being in direct contact with the aqueous, but in other places they are covered over by an extension of the pigment epithelium. The iris root above is firmly adherent to the ligamentum pectinatum, but in general is little if at all thinned. On the sides the root is free.

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The filtration angle, both directly above and on the sides, contains a greater or less number of tumor cells, evidently originally metastatic from the aqueous humor. Above, they form small nodules in the line of adhesion of the iris root. On the sides, they completely fill up the spaces of Fontana. In many places they extend into the canal of Schlemm and even continue into its venous collaterals.

The ciliary body and its processes away from the tumor are normal, except above where the epithelium of the processes shows proliferative changes evidently due to contact with the lens. The latter is normal.

The choroid, except where it is invaded by the tumor, is normal. The retina shows numerous punctate hemorrhages and a small amount of hematogenous pigment associated therewith. The ganglion cells are still present apparently in normal numbers in the macula and on the nasal side, but have disappeared on the temporal side anterior to the equator. The optic disk is slightly depressed and the lamina cribrosa curved backwards. The nerve stem in the region of the lamina cribrosa shows an early stage of cavernous atrophy and neurogliar proliferation.

The Sclerostomy Wound.—The fistula is partly filled with an extremely delicate connective tissue almost free from cells (Fig. 2). Caught within its meshes are a few tumor cells evidently deposited from the aqueous. (Fortunately they are too few to have complicated the process.) The tissue evidently has originated not from the sclera, but from the tissue of the bleb. Within it are numerous irregular, ill-defined empty spaces which communicate with other spaces which open directly into the anterior chamber. The latter are thus analogous to iris crypts. The free surface of the tissue is not covered with endothelium, nor are the spaces or crypts.

The edges of the scleral fistula show evidences of recent proliferation, with formation of new fibrous tissue and increase in the number of fixed cells. This, no doubt, has resulted from the trauma of the operation. The lumen is therefore somewhat smaller than it originally was (1*mm*). There has also been some proliferation from the outer surface of the sclera everywhere beneath the bleb. The new tissue resulting has a much denser character than that of the bleb itself, and in places has extended as a thin layer over the outer end of the fistula, thus becoming a sort of cribriform plate with wide irregular openings. Descemet's membrane ends abruptly about .5*mm* from the edge of the fistula, apparently having retracted from the opening. The corneal endothelium continues almost to the edge of the fistula, but nowhere extends into the latter. The outer edge of the fistula is about .5*mm* from the canal of Schlemm. The root of the iris remaining after the iridectomy is firmly adherent to the corneosclera and is much thinned. It does not quite reach the edge of the fistula. In the line of adhesion there are a number of sarcoma cells, as already mentioned.

The bleb over the fistula consists of a highly œdematous delicate connective-tissue meshwork containing stellate fixed cells, and closely resembles the unpigmented stroma of a normal iris. It contains few blood-vessels and shows no infiltration with chronic inflammatory cells. Within it occur irregular communicating spaces which at first sight appear entirely empty, but which on closer examination are found to be partly filled with a barely visible connective tissue, free from fixed cells, continuous with the surrounding stroma. This tissue is even more delicate than that within the fistula. None of the spaces is lined with endothelium. Some of the large spaces extend up immediately beneath the epithelium, as shown in Fig. 3.

The epithelium over the bleb is thinner than that of a normal conjunctiva, due to a reduction in the thickness and number of the squamous cells on the surface. Another noticeable change is that the basal cells are evidently swollen, being increased in size and having a more transparent and less deeply staining cytoplasm than is normal. These changes are especially marked in the epithelium over the large spaces just described.

Anteriorly the bleb extends over the cornea somewhat beyond the normal position of the limbus. Posteriorly it ends rather abruptly in dense fibrous tissue. Here there are a number of foreign-body giant cells enclosing minute particles probably introduced at the time of operation, and also a small amount of hematogenous pigment. Laterally, as shown by the examination of numerous sections, the œdematous tissue of the bleb passes insensibly into the untraumatized conjunctival tissue. The latter seems to show slight traces of œdema even to the middle horizontal line, but this is difficult to determine with certainty owing to the necessarily small amount of conjunctiva left here at the enucleation. At the periphery of the bleb the subepithelial tissue shows moderate infiltration with lymphoid and plasma cells.

When first seen the case was regarded by me as one of chronic glaucoma in which an acute attack had supervened. The eye was only moderately congested, although the tension was high (60*mm*) and the cornea steamy. The history of loss of vision of only a few days' duration was attributed to faulty observation on the part of the patient. After several days, the tension not responding to miotics, sclerostomy was performed.

The dark mass, at first barely visible at the bottom of the anterior chamber, exactly simulated a hyphæma. As it grew larger, however, I suspected its real nature, owing to its dark color and to its pushing the root of the iris backward (as shown in Fig. 1), although ophthalmoscopic examination and transillumination were negative. The patient was kept under observation and finally it became possible to demonstrate the tumor both with the ophthalmoscope and transilluminator. Enucleation was then performed at once, seven and one-half weeks after the sclerostomy.

The tumor, a melanotic spindle-cell sarcoma, was found to replace the ciliary body below and extend into the anterior chamber. It presented no features of special interest, except possibly its small size, its active proliferation, and its intraocular metastases.

The duration of the glaucoma in this case is difficult to determine. The slightly atrophic condition of the iris and the complete blockage of the filtration angle would seem to indicate considerable duration. Above, the iris root was firmly adherent to the corneosclera, while below, the filtration angle was filled up by direct extension of the tumor. Everywhere else the ligamentum pectinatum was overgrown with tumor cells evidently metastatic from the aqueous humor. The slight cupping of the optic disk, on the other hand, would seem to indicate a short duration for the glaucoma, although it is possible that the excavation receded after the tension was lowered by the sclerostomy.

A feature of some interest in this case was the occurrence of separations of the choroid a week after the operation. These occurred on each side, were very large, and had no relation to the tumor, completely disappearing in about a week. The generally accepted explanation for such separation is that a slight cyclodialysis is produced by the traction on the iris incident to the iridectomy, so that when the intraocular pressure reaches a certain height the anterior chamber empties itself into the subchoroidal space. In the present case no traces of a present or past cyclodialysis could be found, but no doubt a small one could have healed without leaving any visible trace.

The retinal hemorrhages also noted in this case no doubt resulted from the great reduction in tension immediately following the sclerostomy. They were so abundant as to suggest obstruction of the central vein, but serial cross-sections of the optic nerve showed both central vessels practically normal.

The chief interest in this case relates to the sclerostomy and its effects. This was carried out by the method described by me five years ago, but with one modification, namely the excision of the episcleral tissue from the region in which the opening was to be made. My reason for this was my belief, based upon the microscopic examination of a few unsuccessful cases, that the closing of the scleral opening, when not due to incarceration of the iris or lens, was chiefly due to proliferation of the episcleral tissue. In the present case this modification was certainly a success, but further experience with it than I have yet had is needed to determine whether or not it should be adopted as a routine procedure.

While my method of performing sclerostomy has certain disadvantages, it has seemed to me to possess important advantages over the Elliot method. In the first place the keratome incision may be so directed that the inside opening is farther away from the ciliary body than the outside opening. As a result, when the sclerostomy is made the fistula is slanted away from the ciliary body. By Elliot's method the fistula, on the contrary, is slanted towards the ciliary body. By my method there are no tags of tissue remaining on the edges of the opening, whereas by Elliot's method the whole disk is not cut out cleanly by the trephine, but the disk remains hinged and is cut away by means of scissors. This must leave a ragged edge favoring tissue proliferation. By my method there is less danger of injuring the lens, and the disk cannot be lost into the anterior chamber. The chief disadvantages are that more care is required to avoid buttonholing the conjunctiva, and the special instrument employed easily becomes dulled and requires frequent resharpening.

In successful cases of sclerostomy the conditions finally obtained are no doubt practically the same whether the operation is done by the La Grange, the Holth, the Elliot, or my own method, so that the anatomical findings in the present case are no doubt of wide application. That the operation was successful in the present case was shown by the fact that a typical so-called bleb was formed and that the tension was reduced from 60*mm* to 30*mm*. That the result would have continued indefinitely in a case of primary glaucoma I am certain, because I have never seen a bleb fail to persist that was translucent and free from inflammation seven weeks after the operation.

On microscopic examination it was found that the "bleb" was not really such in the ordinary sense of the term, but that it consisted of an œdematous delicate connective-tissue meshwork closely similar to iris stroma.[1] Ramifying within this tissue were irregular communicating spaces, some of them comparatively large (Fig. 3), which were incompletely filled with connective tissue so extremely delicate as to be barely visible. None of the spaces were lined with endothelium or had definite walls. Evidently they resulted from the distention of the tissue by the intraocular pressure. Some of the large spaces extended up immediately beneath the epithelium so that the latter was in direct contact with the aqueous humor.

Especially instructive was the relation of this œdematous tissue to the scleral fistula. Instead of being raised up from the latter, the tissue extended down into it to about two-thirds of its depth. Within the fistula, however, the tissue was extremely delicate and on its inner surface presented occasional openings similar in size and appearance to iris crypts, through which fluid must have escaped from the eye into the bleb. Thus, although as dimly seen through the bleb the fistula appeared open, it was really incompletely occluded by delicate tissue.

In the two eyes[2] examined by Holth (3), one, six months after an Elliot, the other, three years after a Holth punch operation, he describes only the scleral fistulæ, and makes no mention of the way in which the latter communicated with the blebs. In fact, he fails to describe the blebs at all. Possibly post-mortem changes rendered the external structures of the eyes unfit for careful study. In both cases the fistulæ were lined to a greater or less extent with iris pigment, and therefore Holth holds that the incarceration of iris tissue in the wound is a distinct advantage, and states that he endeavors to have this take place. Elliot, on the other hand, endeavors to avoid this, maintaining that it favors closure of the scleral opening. Certainly it is not essential to successful results for the fistula to be lined by pigment epithelium. This is proved by the present case in which the fistula was free from iris pigment. Nevertheless, it seems possible, at least under certain conditions, that incarceration of some iris tissue in the wound may be advantageous, as has been noted after ordinary iridectomy and iridodesis.

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[1] In spite of this fact I continue to employ the term for the lack of a better one.

[2] In addition to these two eyes, Holth examined microscopically an eye that had been successfully operated upon by iridencleisis.

Bachstez (4) examined microscopically three eyes upon which sclerostomy had been performed, but in only one was the result successful. On this a Lagrange operation had been done fifteen days before the death of the patient from pneumonia. Clinical notes regarding the eye condition subsequent to the operation were lacking. There was a definite fistula found in the sclera over which the conjunctival tissue was œdematous but not elevated. The wall of the fistula was not lined with epithelium. No mention was made of cyst-like spaces in the œdematous tissue. Probably after a longer period of time the conditions would have become essentially the same as in my case.

Elsewhere (5), I have brought up the question whether or not, after sclerostomy, the fluid escapes mainly in the manner generally assumed—that is, through the tissue spaces of the conjunctiva. It seemed to me that the sharply circumscribed character of the bleb indicated that little fluid could escape from it into the surrounding conjunctiva, and that probably most of it passed through the epithelium into the conjunctival sac. The findings in the present case, while not conclusive evidence, lead me to believe that this view was erroneous, and that the fluid really escapes chiefly by way of the surrounding tissue, although no doubt a certain amount diffuses through the epithelium. For all the spaces in the bleb were in communication with each other and with those of the uninjured conjunctiva at each side. Egress of fluid was cut off only in proximity to the line of the conjunctival incision where there was formation of fibrous tissue. The pressure was necessarily greatest directly over the scleral opening, while towards the periphery it must have become rapidly less owing to the wider area of tissue receiving the fluid and to the resistance already encountered. Hence the limitation of the cystoid condition to a circumscribed area about the scleral fistula.

In connection with the question of the efficiency of the drainage outlet after sclerostomy, it seems to me that, in addition to the pressure under which the intraocular fluid is secreted, another factor requires consideration. This is, the rate of total secretion against given pressure. For it by no means necessarily follows that because two glaucomatous eyes have equal intraocular pressures their rates of secretion would be equal, especially against equal lower pressures. With a slow rate of total secretion it is obvious that an extremely small outflow would suffice to reduce the intraocular pressure to normal. Possibly this condition obtains in cases, occasionally met, in which no bleb has formed and the scleral fistula has apparently closed, yet in which the intraocular pressure has been permanently reduced to normal. On the other hand, in cases with a high rate of total secretion, the intraocular pressure might remain high in spite of a voluminous bleb and an extremely large outflow. Perhaps it is to this type to which most cases of hemorrhagic glaucoma belong.

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TRAUMATIC PULSATING EXOPHTHALMOS,[1] WITH COMPLETE BIBLIOGRAPHY.

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(*With one photograph on Text-Plate IV.*)

TRAUMATIC pulsating exophthalmos is of sufficient rarity to warrant the presentation of this case.

Mr. J. R. L., aged 39, May 31, 1913, was riding on a large open street-car which was derailed against a tree and he was thrown to the ground, striking his head. After immediate care in the Mercy Hospital, Pittsfield, his physician, Dr. A. E. England, who has kindly given me his report, found him the next day dazed, with all signs of true fracture of the base of the skull: bleeding from the nose, ears, and mouth, with vomiting. No paralysis of the face, all reflexes normal. The mind cleared in about four days and memory was gradually regained. Hearing on left side lost, and there was slight ptosis of the left upper eyelid, with constant complaint of dizziness and headache. On July 6th, about five days after the accident, the patient "felt something like electricity" at the upper corner of the left orbit, which was found to be a definite pulsation and bruit. At that time, there was marked diplopia, dilated pupil, and beginning proptosis.

The patient, when sent to me on May 7, 1914, by Dr. Leo H. Neuman, complained of a constant noise in his head and a terrible headache.

The right eye: vision $\frac{20}{30}$, Jaeger 1. Eyeball decidedly proptosed, 30*mm* by Hertel's exophthalmometer with limitation of outward motion. The veins of the lids, especially those at the inner corner of the upper one, prominent and tortuous. Conjunctiva of the lower half of the ball and the lower lid congested, with many full, dilated, tortuous veins, especially one in the lower cul-de-sac, which extends from the nasal side to within 6*mm* of the temporal margin. Pupil 3.5*mm*, active to light and accommodation, tension normal, media clear, disk slightly oval, axis 90°, sharply outlined, with small central excavation. Both retinal arteries and veins overfull, especially the latter; no hemorrhages although the disk congested. No palpable pulsation of the eyeball.

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[1] Presented in part at meeting of Academy of Ophthalmology, etc., Boston, Oct., 1914.

The left eye: vision $\frac{20}{30}$, Jaeger 2; the proptosis is much more marked than on the right side, 40*mm* by the Hertel instrument. An extremely large mass of tortuous dilated blood-vessels on the upper lid. In the upper-inner corner of the orbit is a large dilated vessel, about 2*cm* in diameter, transmitting a distinct bruit. Visible pulsation of the globe. Entire conjunctiva congested, with numerous dilated veins of bright red color greatest over the inner half of the globe. Pupil 3.5*mm*, active to light and accommodation, tension normal, disk round; extremely full, tortuous, constricted, and distended retinal veins; occasional pulsation of retinal arteries, no hemorrhage or exudate. Limitation field of motion, eye turned in 30 degrees, abducens paralysis. Bruit most intense over the left supraorbital ridge although felt over the entire head. A systolic blowing murmur heard over the same area is stopped by carotid pressure.

Left ear: Thin gray retracted membrane. Hearing so reduced that only the high notes are heard at 2*cm*. Large perforation of the cartilaginous septum of the nose.

Dr. Neuman in his complete examination found the apex beat in the 6th space, systolic pressure 120, diastolic 82.

On May 29, 1914, the first photographs were taken. The right eye was prominent, vision $\frac{20}{30}$, Jaeger 2; the vessels on the upper eyelid tortuous and the bulbar conjunctiva congested. The left eye, vision $\frac{20}{50}$, Jaeger 6, showed a greater dilatation of the ophthalmic vein, eyelid vessels over-distended, bright red congestion of the entire eyeball, extreme exophthalmos visibly pulsating. By tropometer, moves 15° down, 10° up, 30° to right, 0° to left.

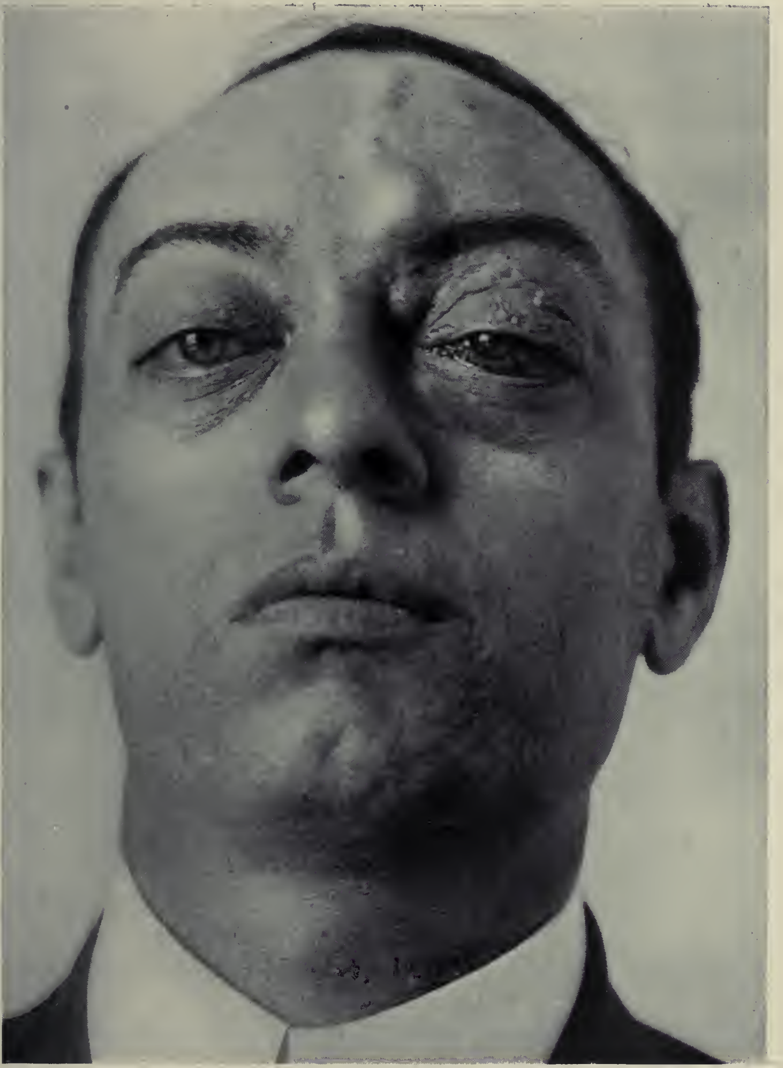
X-ray examination failed to show any fracture, although there was very evident separation through the frontal bone, extending from deep in the left orbit to the vertex between the parietals. The course of this depression is outlined by the large ophthalmic vein shown in the photograph.

Wassermann and Noguchi tests negative.

Slight contraction of the field of vision for form as seen by the charts.

Pressure on the right globe reduces the ball, which then pulsates; the same pressure on the left causes a partial re-

ILLUSTRATING DR. BEDELL'S ARTICLE ON A CASE OF TRAUMATIC PULSATING EXOPHTHALMOS



Definite mass in inner corner of left orbit. Fullness of vein which outlines the palpable separation between the frontals, congestion of skin, tortuous vessels in upper eyelid, and congestion of bulbar conjunctiva.

placement with very strong pulsation and the patient complains of dizziness.

Carotid pressure or pressure on the ophthalmic vein deep in the left orbit stops the pulsation and bruit. Change of position has no effect on the exophthalmos, although lying down increases headache.

On October 4, 1914, the bulging vessel is decidedly larger, being 4 x 1¾*cm* in its widest part, over the supraorbital ridge. A new venous dilatation is now seen on the right side over the lacrimal sac. This 2 x 1*cm* pulsating area was not present until this date.

October 4th, O. D.: vision $= \frac{20}{20}$ (?), Jaeger 1. Bulges 29*mm* by the Hertel instrument. Pupil 3.5*mm*; no further change in the fundus. O. S.: vision $= \frac{20}{100}$, Jaeger 6, 37*mm* by Hertel. Globe directed forward and inward but not depressed. Disk margin above and below somewhat blurred.

The margin of a definite dull congestion of the skin, starting on the right side of the nose, has gradually widened over the forehead until it is now about 7*cm* at its widest part. There has been no improvement in the general condition of the patient, the diplopia is unaltered, but as yet he will not consent to operation.

In 1907, de Schweinitz and Holloway published a monograph of great value, considering spontaneous and traumatic exophthalmos up to July of that year. The following brief summary covers the cases of traumatic exophthalmos recorded since their article, and also refers to three spontaneous cases, only one of which, however, did not appear in their report.

Yvert refers to Gasparrini's case reported in June, 1906, and included in the previously published reports but again cited because of the treatment. Case of exophthalmos reducible by compression with pulsation murmur. Disappearance of symptoms on compression of the carotid, administration of potassium iodide, and instillation of adrenalin for ten days.

Beauvois reports two cases. The first, a woman of 41, fell down-stairs fracturing the base of her skull. A month afterward, right-sided exophthalmos without pain. Systolic murmur. Later, right-sided abducens paralysis, diminished vision, exophthalmos. Ocular and carotid compression without result. Ligature of the common carotid three months after accident, cessation of the murmur with slight aphasia and left lid paresis. Persistence of the exophthalmos, although somewhat lessened, with gradual loss of vision. Ten days later, reappearance of the murmur, which could, however, be stopped by compression of the left carotid. Injection of 5*cu cm* of 1% gelatinized serum into the thigh every other day. After three injections murmur lost. Injection increased to 20*cm*, then to 50*cm*, at last to 100*cm*. Exophthalmos disappeared, but paralysis of both abducens and slight dilatation of the pupil persisted. Three months after beginning of treatment, local cure.

Second case, a woman 53 years of age, had received a severe blow beneath the right eye with the handle of a pump, ten years before. First seen December, 1905. In August, 1905, intense pain in the right side of head. At the end of December, 1905, diplopia, exophthalmos, conjunctival reddening, systolic murmur. Fundus slightly congested. Vision, right eye, 0.4; left eye, 0.6; paralysis of the right abducens. Visual field slightly diminished. Injection in the thigh of 2½% gelatin every five days. After the 22 injections, exophthalmos reduced one-half, with normal motion, and complete disappearance of the diplopia.

Santos Fernandez saw a man of 47, December 16, 1905. Forty-two days before, he had been struck by a hammer, which rendered him unconscious for three days. Upon regaining consciousness, noise in head with moderate exophthalmos and ptosis. Pupil normal. Conjunctiva congested. Compression of the carotid caused disappearance of symptoms. On the 24th of December, started injection of 2% solution of gelatin and 2% of sodium chloride; by the 20th of January much better. Pulsation stopped and exophthalmos disappeared.

Becker cites the case of a soldier who was wounded by the explosion of his gun on May 26, 1906. Four wounds on the right side of face, two upon nose, one at the corner of his mouth, and another in the right eye. On the tenth day, protrusion of the left eye, which increased steadily in the following days. Retina showed hemorrhages, and the movements of the eyes became more and more limited until entirely lost. On the eighteenth day pulsation appeared. Compression of the carotid caused diminution of the pulsation. Skiagraph showed a fragment of bone 2 x 1.5*cm* in the neighborhood of the sella turcica and in the cavernous sinus. July 3, 1906, ligature of the internal carotid. Relief for four weeks and then return of the former symptoms, but in eight weeks great improvement. After three months, further improvement. Vision with a + 4 = $\frac{5}{15}$. Lateral movements of the eyeball normal.

Jacques reports a man of 25 who was injured in a motor-cycle accident by falling against the wheel, striking on the right side of head, fracturing the base of the skull. Three weeks later, pulsating exophthalmos. Intense epistaxis nine times in six weeks from the right nose, which occurred after any strong effort. Ligature of the right common carotid. Three days later, improvement, but after a short time recurrence of all symptoms. Still later, operative exposure of the inner portion of the orbit. A polyp was found in the sphenoidal sinus which communicated with the cavernous sinus. Sphenoidal sinus packed with iodoform gauze which was removed on the sixth day without hemorrhage.

Pooley reports a negro of 30, struck on the back of the head by a "spliced blackjack." Three wounds on the scalp, one on the parietal bone near its junction with the occipital, one farther forward, and another on the temple. He was felled by blow and rendered unconscious. Upon regaining consciousness, he was greatly disturbed by a most distressing noise in the head. Two days later, all symptoms of arterio-venous aneurysm present except pulsation. Eye protruded, blood-vessels of the conjunctiva and lids dilated. No pulsation of the eyeball detected, but when the ear was applied over the globe blowing murmurs and a continuous whirring, rumbling sound were heard. The eye could be pushed back into the orbit by the hand. Compression of the carotid diminished but did not stop the bruit. No change in the fundus and vision seemed unimpaired. Patient too illiterate for exact vision. Treated for a few days by a pressure bandage and compression of the common carotid. On March 16th, ptosis, exophthalmos, enormous dilatation of the vessels of the conjunctiva and lids, pulsation easily obtained especially near the inner canthus, papillitis with enormous dilatation of the retinal vessels. One vein in the lower temporal region seemed to be obstructed and, above and below the obstructed portion, was greatly distended. Noises in the head had become more aggravated and to this was added occasional violent pain in the orbit. There was no impairment of hearing. Patient would not consent to operation.

In discussion of Dr. Pooley's paper, Dr. Knapp stated that he had had three cases, in all of which the ligation of the common carotid had relieved the bruit, exophthalmos, and chemosis, but the optic nerve went on to atrophy.

Oppenheimer had seen a case some years ago in which the carotid had been ligated. Secondary hemorrhage with fatal result had followed. It proved to be an erectile tumor.

Claiborne ten years ago had seen a case like Dr. Pooley's. He had applied pressure bandage, which was kept up for eighteen months, and had administered mixed treatment internally. A perfect cure resulted.

Gruening had seen the vision immediately restored after ligation of the carotid in a case operated upon some years ago without anæsthesia.

Tyson has seen atrophy follow the tying of the common carotid, although the other symptoms had subsided.

Flemming and Johnson saw a male of 47, September, 1907, who, although previously in good health, fell, striking back of his head, and was unconscious a few minutes. A month later, left hemianopia, no proptosis, but soon afterwards constant beating noise in the head. April 19, 1908, left eye markedly proptosed, lids slightly swollen and congested, conjunctiva deeply congested, with chemosis, especially in the lower fornix. Pupils equal, active to light and accommodation. Distinct pulsation of the left eye with limitation of all its movements. Marked continuous murmur with systolic exacerbations over the left eye and skull. Pressure on common carotid stopped murmur. Right eye, vision $=\frac{6}{12}$. Left eye, vision $=\frac{6}{24}$. Right half each field blind. Fundi normal. May 14th, left common carotid tied, at level cricoid cartilage, and pulsation stopped.

Barrett and Orr cite the case of a male aged 50 years, who ten weeks before, while intoxicated, fell and remained unconscious from 24 to 36 hours. In hospital for three weeks. No evidence of organic lesion. Six weeks after the injury he complained of buzzing in the ears, and a few days later his right eye was prominent, with vision $\frac{6}{36}$. The lower lid everted, marked exophthalmos in the middle line, conjunctiva of the lower lid engorged and much swollen, fundus veins dilated. The external canthus was divided and the orbit explored, the finger being pushed behind the eye where a pulsating mass was felt. March 2d, a marked bruit over the temporal bone and the eye synchronous with the pulse. March 4th, vision as before, but eye was almost stationary with many hemorrhages and distended veins in the fundus. Neither rest nor medical treatment stayed the progress, so the common carotid artery was ligatured March 11th. Steady improvement, exophthalmos diminished until comparatively slight at the last examination; the movements of the eye returned in part, the action of the external rectus being most limited, and the hemorrhages disappeared from the fundus. Bruit, lost after the operation, returned about a fortnight later, then gradually disappeared again. In October, there was slight proptosis. Vision $\frac{6}{12}$.

Barbieri tells of an Italian, male 43 years old, who reported on the 24th of April, 1907, with an intense pain in the temporal region. On the succeeding day the left eye became prominent and a month later the right eye pulsated. Injection of 5% gelatin tried without result. October 21st, ligature of the right common carotid. The exophthalmos and pulsation continued. On January 8, 1908, the left common carotid was tied. On the 4th of April, the day of his last examination, the exophthalmos continued, the movements of the ball moderately free, pupil inactive to light, headache slight, protrusion and subjective noises persisted.

C. S. Merrill in a personal communication has told me of Miss E. T., aged 50, who fell from a wagon, striking the back of her head, on July 5, 1909. When seen there was much chemosis on left side, with extreme pulsating exophthalmos and aneurysmal bruit. Compression of the carotid stopped the bruit. Vision, right, normal; left, nil. Dr. A. W. Elting ligated the left external carotid. All symptoms were relieved and the eyeball returned to proper position. Some months later, vision, right eye, with correction $\frac{20}{20}$. Left vision, objects to the outer side; optic atrophy.

The wheel of a loaded wagon passed over the head, just back of the eye, of a 24-year-old male, January 29, 1909. Halstead and Bender report that he was unconscious three days. Left eye bulged more at the time of accident than it did when he entered the Infirmary, when it was turned sharply toward the nose and appeared paralyzed. The lids were swollen and it was impossible to close the upper lid, move the jaw, the tongue, or to swallow. Roaring noises synchronous with the heart-beat could be heard from the time patient regained consciousness until he entered hospital. He remained in bed for two weeks following accident, during which time the sight in his left eye became much impaired. Examination made on August 27, 1909. The left eye turned in 45° and was very prominent, $\frac{2}{3}$ of an inch farther forward than the right. Veins on the outside of the upper lid were very large and tortuous. The blood-vessels of the sclera were also dilated. Cornea vascular and over a 4*mm*-square area in its center there was a fairly dense cicatrix. Vision, right eye, $\frac{20}{30-3}$; left eye, $\frac{20}{120}$. September 28th, vision right eye $\frac{20}{20}$, left eye $\frac{20}{50}$. On October 10th, a pulsating tumor felt over the lid and in the inner angle of the orbit; bruit heard over the left temporal region and patient complained of constant roaring noises, heard most distinctly in the left ear. On October 14th, left internal carotid ligated near its origin with chromicized catgut. At present the left eye turns inward and there is some exophthalmos but no bruit.

Lane's patient was struck on head with a brick, three months before fracturing his nose. Twelve days later, ectropion lower lids, marked œdema. Vision $\frac{8}{200}$. Right eye enormous dilatation, retinal veins, small hemorrhages about disk. Pulsation, bruit, exophthalmos. Blowing sound left ear. Pulsation continues over left temporal region with accentuated systolic murmur. Only general treatment and K. I. On June 10th, patient sat up for first time. 5 A.M. 11th, aphasic with right facial paralysis. On September 2d, no pulsation, faint systolic murmur, vessels conjunctiva bright red color. Vision left eye $\frac{6}{6}$.

Orloff's pulsating exophthalmos developed six months after a deep wound in the region of the left parietal and temporal bones in a thirty-year-old patient. A successful result followed ligature of the ophthalmic vein in the depths of the orbit after a temporary resection of the external wall of the latter.

Friedenwald's case of a colored female of 20, although not of traumatic origin, is recorded because of the absence of bruit.

Halstead reports a male of 36, who was struck twice on the left temporo-malar region with a hard instrument February 20, 1910. Unconscious a short time thenwalked home; blood from ears and nose. Facial paralysis next day and roaring in the ears. Two months later, when the left eye was enucleated for panophthalmitis, orbital contents prolapsed. Vision, right eye $\frac{20}{40}$. Diagnosed as pulsating tumor base of brain, probably aneurysm. October 5, 1910, stump left eye removed. Right eye signs of beginning venous stasis. Roaring in ears heard through head, long loud bruit over malar regions. Common carotid and two divisions of superior thyroid ligated. Immediate disappearance bruit. No brain symptoms.

Zeller's patient, 35 years of age on December 24, 1894, shot himself in the right temple beneath the zygoma and in front of the ear. Unconscious. Three weeks after the injury, exophthalmos with ecchymosis on the right side. January 24, 1895, exploration of the right orbit. Vision $\frac{1}{3}$. Movements of the ball limited. Globe directed downward and inward with abducens paralysis. March 5, 1895, exploration on the site of old operation of the neck. Carotid removed between ligatures with no improvement. On April 13, 1895, resection of the frontal bone opening the orbit. An attempt to tie the cavernous and carotid sinus within the orbit resulted in intense hemorrhage and death in eight hours. Autopsy showed that part of the bullet had engaged almost at the apex of the petrous portion of the temporal bone, having entered the internal carotid and the cavernous sinus.

Kraupa, in 1894, saw a 20-year-old man who, while in bathing, dove from a dock two meters in height and who, before he came to the top of the water, felt an intense sound in the left ear, which in the next few days constantly increased. Typical pulsating exophthalmos of the left eye. No operation.

McClellan tells of a man of 32, who was injured eight months before. A machine at which he was working upset, striking him on his chin. Unconscious twenty-four hours, with considerable hemorrhage from both the mouth and nose but none from the ears. Slight exophthalmos developed three months later, which grew steadily worse until both eyes were decidedly prominent, especially the right. A distinct pulsation, rhythmical with the pulse, could be seen and felt, also more on the right eye. The conjunctiva was very œdematous and the veins very markedly dilated. Movements of the eyes and visual fields for form normal, but it was impossible to obtain the color fields. Vision, right eye $\frac{2}{20-3}$; left eye $\frac{20}{30-3}$. Bruit audible over the bifurcation of the right common carotid and reached its maximum intensity about one inch behind the external angular process of the right frontal bone. Distinctly audible over the left side but not so marked and of a different character and higher pitch. By compressing the right common carotid the bruit and the pulsation of the eyes stopped. Compression of the left carotid had no effect. Vision reduced to $\frac{20}{50}$ in each eye. Ligation right internal carotid with immediate cessation of the bruit and pulsation of the eyes. No return. In one week the engorgement of the retinal veins and choked disk disappeared and vision returned to normal, although the conjunctiva was still congested and the exophthalmos only slightly reduced.

Lystad's 15-year-old stoker was shot with a revolver bullet through the right nose in August, 1902. Spastic hemiparesis with incomplete anæsthesia. Three months in hospital. Resumed work nine months later. Two years after the injury, increasing swelling over the right eye, with exophthalmos and a systolic murmur. Five years after the accident he was struck with a fist, when he again came to the clinic. Eye movements then normal. Pupil slightly small. No pulsation. Subjective and objective disturbances completely lost on digital compression of the right carotid. September 17, 1907, ligature of the internal carotid and the external carotid and jugular vein. Temporary improvement. After a time pulsation and exophthalmos returned. In November, 1907, electrical treatment considered worthless. In beginning of 1908, condition about the same as before the operation. Patient was unable to work. January 24, 1908, orbital operation by Schiotz. After three weeks an objective improvement, but still an intense headache and slow pulse.

In the following week swelling became less and pulse normal. Out of bed for the first time in two months. Vision, fingers at 2 meters; visual field contracted, tension plus. After a few months the patient was able to work again and the protrusion was hardly noticeable. The glaucoma, however, increased, miotics having no effect. Conservative operation not permitted by patient. Eye was enucleated in December, 1908, after which he had no headache and the murmurs were great only when lying down.

Risley reports two cases. The first was knocked unconscious by a fist blow on the ramus of the right jaw. Four weeks later pain in the head, diplopia, and confusion. Proptosis of right eyeball about 10*mm*, swelling of the lid, conjunctiva chemotic with full veins near the inner canthus. Limitation motion except downward. Systolic pulsation best heard over the right eye. Vision = $\frac{6}{12}$.

The second case was a male of 30 who three years before had had his head caught between a trolley car and an express wagon. Unconscious seven weeks. Abducens paralysis, slight proptosis of the right eye. Loud blowing systolic bruit heard over the entire skull but loudest over the right eyeball and left frontal. Bruit lost on right carotid pressure. X-ray negative in both cases which are still under observation.

A man 18 years of age who had been struck on the head with a piece of iron was seen by Ginzburg. Unconscious fifteen minutes with bleeding from the mouth and nose. On examination hemorrhage in the left lower lid. Right lid swollen, ptosis marked, injection and protrusion of the fixed globe, and definite systolic pulsation. December 7th, ligature of the right common carotid. No change, so March 27, 1911, clamping of all vessels within orbit by forceps, which were left in the wound. March 30th, protrusion of the eyeball greater than before the operation. July 17th, protrusion very much less. August 10, 1911, ptosis slight, thickening of the bulbar conjunctiva. Protrusion entirely disappeared. Eyeball freely movable. No conjunctival hyperemia, no pulsation. Vision, right eye, 0. Vision, left eye, 0.5.

Savariaud examined a small girl who after having had her head squeezed between a large plank and a boat had a hemorrhage from the right ear and nose. Later paralysis of the abducens on the right side, exophthalmos, and a continuous murmur with systolic emphasis. Slight pulsation. Injections of gelatin after Lancereaux's method failed.

James and Fedden's first case, fell nine feet, striking on his head, became unconscious but only had a scalp wound, some bruising over the right fronto-parietal region, with bleeding from the nose and a double black eye. The right pupil was semi-dilated and sluggish in its reaction to light, while the reaction on the left side was brisk. On the next day there was very extensive ecchymosis on both sides, that on the left being the more marked. Ten days later, left-sided ptosis and a pulsating exophthalmos. Treated by a rest in bed and a pressure bandage. Three weeks later, a commencing keratitis e lagophthalmos, so the lids were sewed together. Three days later, the left common carotid was tied. After a couple of months, no exophthalmos or pulsation in the orbit; when the lids were separated, the left palpebral fissure was slightly smaller, the left pupil contracted, the vision $\frac{6}{18}$, and that of the right $\frac{6}{6}$.

Second case, female aged 53; four and a half weeks before she had fallen down some steps and became unconscious. Small wound over the right external angular process. Kept in bed for three weeks, but when she began to go about complained of right-sided headache and the right eye began to swell. A normal recovery from her initial head injury; for the first few days there had been considerable subconjunctival ecchymosis which had rapidly absorbed. No ocular palsy. Pupillary reactions normal until she got up when there was right-sided ptosis with proptosis, moderate œdema of the ocular conjunctiva with dilated veins. Eye stationary, the pupil dilated and fixed. Vision, fingers 6 ft. Very marked venous pulsation of the disk which seemed to jump forward at each beat. No pulsation of the globe. Put to bed with a pressure bandage and given iodides internally. Two days later, definite pulsation in the orbit and a faint systolic bruit over the right temporal fossa. Proptosis increased with headache and buzzing noise in the head. Bruit plainly heard over the eye, forehead, vortex, and temporal fossa. The right internal carotid tied just above the bifurcation stopped pulsation. Five weeks later, patient discharged, slight proptosis, very light œdema of the conjunctiva with fullness of the veins and marked pulsation of the disk. When last seen, ten months later, eye moderately convergent, abducens paralysis. Upward and downward movement fair. Vision, right eye, Hm. $1:5=\frac{6}{18}$; left eye, Hm. $1:5=\frac{6}{6}$. The external recti remained paralyzed and the disk pale.

Buchtel operated August 13, 1912, on a patient who was struck on the head with a pitchfork three months before. He had a buzzing sound in his head and in a few days the left eye protruded; well marked exophthalmos, forward and downward. Pulsation of the eyeball and the mass at the upper-inner angle of the orbit, with a continuous bruit and systolic accentuation over the brow and temple. Complained of the noise, diplopia, and headache. Fundus negative. Operation: Incision, eyebrow, angular; superficial and temporal veins tied and superior ophthalmic ligated as far as possible in the orbit. More œdema at first, but no bruit, pulsation, or fundus change. Exophthalmos gradually lessened. Vision $=\frac{20}{20}$.

Buchtel also reports two other unrecorded cases: one a double exophthalmos cured by ligation of the common carotid; the other, unilateral, died after the same operation.

Matthewson saw a male of 32 who had been thrown from top of car October 8, 1910, fracturing the base of the skull. November 5th, left eye very much proptosed with complete ptosis. Considerable swelling of the conjunctiva and much restricted motion of the globe. Fundus negative. Vision, fingers 8 ft. in the upper field, the lower field lost; no pulsation of the globe. December 20th, veins upper lid much dilated, ball pulsated, slight pallor nerve, slight dilatation retinal veins, no bruit, occasional headache. March, 1911, vision almost gone. In August, condition more marked. Loud blowing murmur left temporal heard over greater part of skull. September 5th, common carotid artery tied. Month later, little proptosis, no bruit or pulsation.

Cunningham's case was that of a male, 39, who four years before received a severe blow left cheek; that night felt badly; spat blood. Two days later roaring in his head began, gradually worse. Two months later, sudden pain right temple with marked protrusion eyeball. Right common carotid clamped. Bruit and pulsation lessened at once, lost in four days, although two months later exophthalmos still present. Later, clamp removed by operation.

Maher saw a man of 35 who ten months before had had a blow on his head with a stick, was unconscious thirty hours and dazed a week. Three weeks after injury, right eye began to protrude and throb with marked pulsating exophthalmos, controlled by pressure on the right common carotid. Bruit over eye and temporal region. Marked engorgement conjunctival vessels, œdema conjunctiva, pupil dilated, retinal veins dilated and tortuous, marked œdema optic disk and retina. Headache and whirring noise in head. Right internal carotid tied. Pulsation ceased at once. Exophthalmos diminished. Three years later no exophthalmos, slight pallor disk, and only occasional headache.

The second case, a male of 19, fell 45 feet, fracturing the base of the skull. Unconscious several days. Six weeks after injury, left eye began to protrude and for some weeks progressed, then gradually subsided; the right eye became more prominent. Pain and noises in the head. Right eye proptosed and convergent, conjunctiva œdematous, vessels full, limited motion of the globe up and down, no motion outward, pupil normal, retinal vessels slightly tortuous and dilated. Vision $\frac{5}{18}$, Jaeger 1. Left eye not proptosed, movements upward and downward limited. Pupil dilated. Disk pale. Vision $\frac{5}{21}$, Jaeger 2. Loud bruit over right eye and temple. Left internal carotid tied. One month later, marked subsidence, eye moved up and down but not out, headache better, but bruit persisted, vision same.

De Schweinitz and Holloway collected 54 cases of traumatic pulsating exophthalmos, making a total of 214 on record in 1907. Since then 32 others have been recorded, making a grand total of 246.

In a summary made from the 32 here correlated it is found that common carotid has been ligated 14 times, resulting in cure in 4, improvement in 6, failure in 4; internal carotid, cure in 2, improvement in 4. One case was later cured by the removal of a polyp in the sphenoid sinus extending from the cavernous sinus. Orbital operation has resulted in 3 cures and 1 failure; gelatin cure in 1, improvement in 1, failure in 1; no operation as yet reported in 5; one case died after an attempt to tie the cavernous sinus after ligature of the common carotid had failed.

It is impossible to draw conclusions from the cases here detailed, partly because of the small number and partly because the mere citation of treatment does not explain the actual condition demanding the operation. Ligation of the common carotid is the operation most often performed, but as it may cause death, many fatalities having been recorded, the other operations should receive greater attention in the future. After a careful study it seems that ligation of the superior ophthalmic vein is an operation that should always be done after ligation of one common carotid has failed, and in many cases may be advised as the primary procedure. Although three cases have been cured by the injection of gelatin, it is not here recommended, nor is the treatment by drugs, rest, or even the compression of the carotid.

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CONCERNING REMOVAL OF THE EYEBALL.

II.

FAT IMPLANTATION.

By HARRY S. GRADLE, M.D., Chicago.

(*With three figures in text.*)

IN considering the second phase of this subject, I have confined my discussion to the implantation of fat into the scleral or orbital cavity.

The implantation of an extraneous substance into the empty scleral capsule dates from the first report of Mules (1 and 2) who used a glass ball. This idea for enlarging the stump upon which the prothesis rests, obtained immediate favor and there followed shortly various modifications. Kuhnt (3) and Schmidt (4) implanted a silver ball, Bunge (5) an ivory one, Pick (6) rubber, Claiborne (7) glass wool and asbestos, Bryant (8) aluminum, Hertel (9) paraffine, Schmidt (10) a flamed bone sphere made from the head of the femur of an ox, Elschnig (11) decalcified bone, or a pith ball (12), Alter (13), Oatmann (14), and Spratt (15) paraffine, and so forth. Practically all sorts of solid and semi-solid substances were implanted within the scleral capsule. But nearly all operators have rejected these operations for two reasons: the implant is apt to be extruded, even without visible cause, as late as many years following the operation; and in case of choroidal remnants, the implant causes an irritation that has frequently led to an outbreak of sympathetic ophthalmia (see literature in first article of this series).

Apparently, the first implantation into Tenon's capsule after enucleation was performed by Lang (16), who used a glass, celluloid, or silver ball and sutured the muscles over the implant. Over ten years elapsed before another implantation into the orbit was recorded, when Lagrange (17) reported the results he obtained by inserting a complete rabbit's eye, cornea backward, into the empty capsule of Tenon. Shortly after this, Roemer (18) injected paraffine into the capsule. This same procedure was adopted by Ramsey (19) who reported 34 cases with four failures and one subsequent sympathetic ophthalmia (certainly not due to the paraffine). Davis (20) claimed that a sympathetic irritation was due to a lump of paraffine in Tenon's capsule, extending to the apex of the orbit and pressing upon the nerve. Suker (21) implanted preformed paraffine into both the scleral and Tenon's capsule. The same technique was used by Spratt (22) in 40 cases in which he claimed that the paraffine became surrounded by a connective-tissue capsule. Nicolai (23) followed Lagrange's technique of implanting a rabbit's eye into the empty capsule of Tenon, except that he placed the cornea facing anteriorly. This was followed by another report from Lagrange (24). Wicherkiewicz (25) tried this method in 32 cases with only one failure. Five years later, the same author (26) proposed implanting a piece of the patient's skin and subcutaneous fat, rolled up and tied with a piece of catgut. The individual muscles were sewed together over this.[1] So many other implants, together with minor variances in operative technique, have been advocated that a mention of all would be interminable: hollow glass ball, Greenwood (27); glass ball, Schmidt (28); pith ball, Elschnig (29); lead-free glass ball, Suker (30); simple evisceration without keratectomy and inversion of empty sclera, Gifford (31); etc.

The first operator to implant autogenous fat into the empty capsule of Tenon was Barraquer (32) in 1901. He obtained the fat from the gluteal region. Seven years later, Bartels (33) reported two similar successful cases. He also performed the operation upon a dog, and three and a half months later, excised the implanted fat. This was found to have shrunk but little, and was forming a perfect funnel-shaped mass, pointing toward the apex of the orbit. Ohlemann (34) used thi character of implant for several years, but did not report his cases in number or detail. Implanted fat, obtained from the shoulder, was used in five cases by Velez (35) and by Rollet (36). In 36 cases of fat implantation into Tenon's capsule, Lauber (37) experienced six failures. Owing to his method of suturing the muscles over the implant, he found a certain amount of shrinkage to occur during the first two or three months. Marx (38) did not suture the muscles and did not speak of any shrinkage occurring. Good results were reported by Jacob (39) in one case, Ibershoff (40) in one case, Alling (41) in one case, Tschirkowsky (42) in 35 cases from the Axenfeld Clinic, and Waldstein (43) in the first 20 cases from the Elschnig Clinic. Weidler (44) spoke of the prolonged convalescence in three cases and reported a shrinkage of nearly one half of the amount implanted.

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[1] Sattler (45) implanted cartilage obtained from the rib into the empty capsule of Tenon after enucleation.

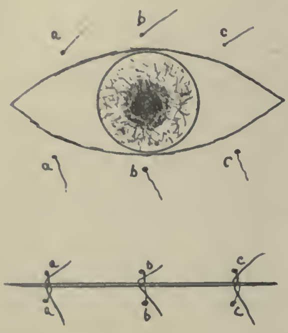

Fig I

The operation of evisceration, combined with intrascleral implantation of fat, does not vary from the simple operation except in the last stages. If the evisceration is to be performed without subsequent implantation of fat, the section of the sclera is oval-shaped so that the wound after closure is linear (Fig. I.). But when an implant is to follow, the excision of a quadrangular section of cornea and sclera is necessary. As much of the latter as possible is to be preserved. From the four corners of the opening, four oblique incisions are made, forming four scleral flaps

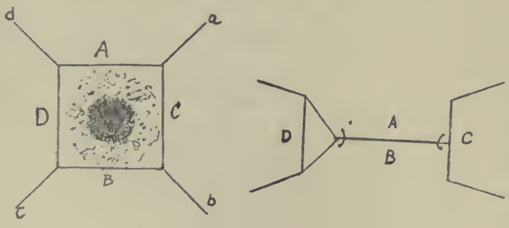

Fig II

(Fig. II.). After the scleral capsule has been eviscerated and the hemorrhage stopped, adherent remnants of choroidal tissue must be searched for and carefully removed. Any such adherent particles not only militate against the successful inclusion of fat, but are a constant source of danger to the fellow eye. When the scleral capsule has been proven to be clear, it should be packed and tightly compressed with a sterile gauze to stop further hemorrhage. The retaining sutures may then be laid through the lips of the scleral wound. The flaps A and B should first be drawn together and sutures placed through the corners so that upon tying, the knots are buried

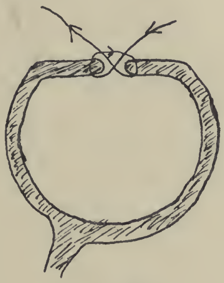

Fig. III

(Fig. III.). Similar silk sutures are then placed through the corners of the flaps C and D so that these will overlap the first two. The knots are also buried. The accompanying diagrams illustrate the course of the sutures.

The gluteal region, from which it is preferable to obtain the fat, can then be sterilized by the procedures usually employed in cleansing any field for a general surgical operation.[1] Anæsthesia is best produced by the subcutaneous use of novocaine and adrenaline, and sufficient time (at least three minutes) must be allowed to elapse before making the incision. Hurry is inadvisable, for time is required for the pressure to control the intrascleral hemorrhage. The gluteal incision should be made as nearly parallel to the course of the fascia as possible— that is, along the course of the gluteus maximus. The subcutaneous fat immediately springs into view and a piece of the necessary size can be dissected out and preserved in a sterile square of gauze. An assistant sutures the wound, while the operator removes his gloves and cleanses his hands, preparatory to inserting the fat into the scleral capsule. This must be done under the strictest aseptic precautions.

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[1] Cleansing with a $\frac{1}{10}$% alcohol-sublimate solution (80% alcohol 100: bichloride 0.1) followed with tincture of iodine.

The piece of fat inserted should be about two centimeters in diameter. Too small a piece does not fill out the scleral capsule, while too large a piece defeats its own object in that it results in extrusion. The lips of the scleral wound are held open by forceps in the hands of assistants and the fat inserted. A broad spatula then holds it in place while the sutures of the first pair of scleral flaps are drawn taut and tied. These sutures of silk of the two pairs of scleral flaps are then buried under a linear suture of the conjunctiva. A rather firm bandage should be applied for at least forty-eight hours.

The implantation of fat within Tenon's capsule does not require any marked variance of technique from the simple enucleation. After a typical enucleation, a purse-string suture of silk (No. 2) is passed through the open mouth of Tenon's capsule, so as to include, if possible, the four ends of the recti muscles. It is better to insert this suture through the conjunctiva, and make it emerge nearly so that the knot will be extra-conjunctival. In obtaining the fat, the same technique is used as for fat to be implanted within the scleral capsule, except that a larger piece is necessary. The implant should have a diameter of at least three centimeters and should be packed firmly into the capsule, forming a funnel-shaped mass of tissue. The purse-string suture through the mouth of the capsule is drawn tight over the whole mass, and a linear suture of silk (No. 0) closes the conjunctival wound.

Fat, in contrast to implants of other character, is a live pliable tissue that requires but little nourishment. It is homogeneous with the tissues of the orbit, and, unless infected, causes absolutely no irritation. As shown by the experiments of Bartels (46), it conforms to position and forms a funnel-shaped mass, with the apex toward the rear wall of the orbit. The nourishment necessary to keep the implanted fat alive until the vessels can penetrate the mass is surprisingly small. The perfect elasticity of the fat tends to form a cushion upon which the prothesis rests with great ease, and is under the control of the muscles.

In the following chart are tabulated 29 cases of enucleation and 54 cases of evisceration with fat implantation. The general diagnostic headings are the same as those described in the first article of this series. In all but two of the enucleated cases, the fat healed in without trouble. In one, the fat was simply extruded for some unknown reason. The enucleation was performed because of a phthisis bulbi dolorosa, and on the third day the fat sloughed out. Secondary sutures were inserted but these pulled through. The patient was discharged on the thirteenth day with a small stump under the prothesis. In the second case of enucleation, the extruded fat was accompanied by some sterile pus. It was a case of subluxated traumatic cataract, following a perforating injury by a piece of brass. On the second day, light projection became faulty and the eye was removed. On the fourth day, the wound gaped and some fat was extruded accompanied by a small amount of sterile pus. On the thirteenth day, the wound was still open in one small area, but the patient was discharged.

Among the 54 cases of exenteration, the fat was extruded in six, three times without known cause. Two of the cases were perforating injuries and the third was operated upon for secondary glaucoma after an adherent leucoma. In two further cases, the fat was accompanied by a small amount of pus that contained pneumococci. Both were infected perforating injuries. In the third case, a corneal ulcer existed, the eye was exenterated, and on the eleventh day the entire mass of fat, accompanied by sclera and pus, sloughed out. Pneumococci were found in the pus.

Enucleation.		*Evisceration.*
29	Number	54
23	Ganglion Anæsthesia	34
6	Other Anæsthesia.	20
0	Acute Mycotic.	5
1	Acute Non-Mycotic.	4
0	Chronic Mycotic.	0
9	Chronic Non-Mycotic.	18
19	Non Inflammatory.	27
27	Fat healed in.	48
1	Fat extruded.	3
1	Fat extruded with pus.	2
	Fat extruded with pus and sclera.	1

The average length of stay in the hospital did not vary greatly for the two different operations. Nevertheless, some of the cases of exenteration suffered intense chemosis of the conjunctiva for several days following the operation. But this was not necessarily accompanied by extrusion of the implant. There were but five cases of acute infectious trouble, as beginning panophthalmitis, operated upon, and in three of these there was intense œdema of the conjunctiva, followed by sloughing of the implanted fat. We have, thus, a distinct contraindication to fat implantation.

In about half of the cases, the implanted fat was found to have shrunken eventually to about one half of the amount implanted. But this shrinkage can be counteracted by a very simple procedure. A needle is introduced into the center of the mass and slight suction applied. This is to find out whether a blood-vessel has been punctured. If no fluid appears, sterile white vaseline may be injected until the stump is of the desired size. About one to one and a half centimeters will be found requisite. In about three days, the prothesis may be worn again. This procedure is dangerous in those cases of simple operation without fat implantation, for the vaseline is apt to wander, especially into the eyelids. The fat cushion forms an excellent medium for the retention of the injected vaseline.

It is impossible to tabulate the results of these cases and, in lieu of photographs, general conclusions must suffice. The stump following enucleation with fat implantations yields cosmetic results about equal to those following simple evisceration. The implantation of fat into the eviscerated scleral capsule far surpasses the results that can be obtained by any other method, and there results a large, freely movable stump of living tissue, distinctly elastic in character.

IT IS CONSEQUENTLY ADVISABLE TO ENDEAVOR TO IMPLANT AUTOGENOUS FAT INTO TENON'S CAPSULE OR INTO THE SCLERAL CAPSULE, IN EVERY CASE OF REMOVAL OF THE EYEBALL BY ENUCLEATION OR EVISCERATION, EXCEPT IN THE PRESENCE OF ACUTE INFECTION OF THE COATS OF THE EYE.

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ON THE TECHNIQUE OF EVISCERATION.

BY H. GIFFORD, M.D., OMAHA, NEB.

A RECENT review in these ARCHIVES (Sept., 1914, 558) of my article on "Technique of Evisceration" (*Ophthalmoscope*, Jan., 1914) contains a misprint which reverses my opinion on an important point. The review quotes me as saying that in doing an evisceration it is better to do a keratectomy even when a Mules's operation is done. What I really said was, that it was better *not* to do a keratectomy under those circumstances. My position is that there is no excuse for cutting out the cornea no matter what form of evisceration of the eyeball is done, except where it is the seat of active infection. If a Mules's operation is to be done, making the cut through the sclera one eighth to three sixteenths inch above the cornea, and leaving the latter intact, allows a larger ball to be used with less danger of extrusion than if the cornea is excised. No fear need be entertained as to the sensitiveness of the cornea where this is done. It loses most of its transparency and becomes as insensitive as the rest of the surface of the globe and a far better stump is obtained. Where a glass globe is not introduced, the best plan is to make a cut across the cornea and out into the scleral tissue for at least one fourth inch on each side. This allows the interior of the globe to be swabbed out and inspected carefully so that there is no danger of overlooking any small tumor or any adherent bits of uveal tissue. Then by pushing the anterior half of the globe well back toward the posterior wall with a large globular swab an inch or more in diameter, coated with oxide of zinc ointment to prevent its sticking, a large flat stump is obtained which makes a much better support to the periphery of an artificial eye than could otherwise be obtained without the introduction of an artificial vitreous.

THE OPERATIVE TREATMENT OF RETINAL DETACHMENT.

By Prof. Dr. A. ELSCHNIG, Prag.

Translated by Harry S. Gradle, M.D., Chicago, from the *Archiv f. Augenheilkunde*, Vol. LXXVII., 1 and 2.

THAT there is no unanimity regarding the treatment of detachment of the retina is probably due to the numerous variations in the clinical picture of the disease, as well as to the innumerable etiological factors. Only by a comparison of the many forms of treatment practiced upon a large material, other factors being equal, may progress be expected. Consequently, I present my observations upon the various approved methods of treatment carried out in my clinic during the past six years.

As far as possible, I endeavored to proceed with certain measures during certain definite periods. These were: puncture underneath the retinal detachment, either alone or combined with some form of cauterization of the sclera; then the Müller scleral excision according to the original technique and later embodying a modification of my own. During the past five years, we have practiced vitreous replacement, as well as puncture, in connection with the injection of various fluids, and since Birch-Hirschfeld's publication (10), have used his method, which, in substance, varies but slightly from the technique I formerly employed.

In considering this subject, I will discuss each procedure separately, although frequently various methods were tried on one and the same eye in succession. It is therefore impracticable and nearly impossible to present didactical statistics regarding the effect of each procedure. I must confine myself to the impressions made upon me by the clinical course of each case and mention but briefly the histories of the variously operated cases (except the six cases of simple vitreous replacement) that led me to form these conclusions.

Upon 73 patients, there were 83 operations performed. During the period of the Deutschmann procedure (in short, "incision"), according to his last modification (4), the smallest number occurred (10 operations on 10 different eyes); individual puncture was employed 48 times, puncture with cauterization 42, Deutschmann incision 10, scleral resection 16, puncture with vitreous injection 25, and simple vitreous injection 6 times.

In no case was operative interference attempted until the usual conservative measures had been tried. These consisted of absolute rest in bed or in an upright position, sweats, iodides, inunctions in cases with luetic histories, continued use of pilocarpin or eserine, pressure bandage, repeated subconjunctival injection of salt solution, etc. Attention was paid to the position of the head, so that any advance, as in the case of a detachment of the upper segments of the retina, would not involve the macula. I believe this to be of value. But otherwise I cannot persuade myself that any of these conservative measures exerted any appreciable influence during the time that was allowed to elapse before interfering with surgical measures.

In that, I partially agree with Deutschmann (4) who entirely discards the conservative treatment of retinal detachment. There are, however, some cases where these measures are of value, but we are not able to determine, *a priori*, which procedure is best suited to the case in question. The proof of this is in the early appearance of a cyclitic cataract soon after the detachment of the retina has occurred, without any treatment having taken place. We see many such cases.

I do not believe that subconjunctival injections have the slightest effect upon detached retinæ proper, but unquestionably they do exert a decided influence upon vitreous opacities, especially of a hemorrhagic nature, and thus secondarily become important in the treatment of detachment of the retina. We avoid the use of hypertonic salt solutions of high concentrations, for their use results in bulbar adhesions that are not negligible, are very painful, and offer no advantages over the solutions of lower concentration. Frequent injections of a 2% salt solution yield results of equal value.

In 44 cases, no operation was performed. In about one-half of these cases, conservative treatment was used over a sufficient period of time, while, in the other half, operation was refused. It must be added that our clinical material does not lend itself well to lengthy periods of treatment, and frequently patients will leave before we can proceed to such operative steps as are deemed advisable.

In three of the cases treated over a longer period of time, there was a reattachment of the retina. In one of them, however, a myopia of 15 D. led to another detachment within two weeks, and the vision was lost. In the second case the vision increased from fingers at 1 meter to 0.1 with a −13.0 D. lens, although it must be confessed that the patient was observed only three weeks. In the third case there was a keratitis parenchymatosa punctata and a circumscribed opacity and questionable detachment of the retina in the periphery only. This disappeared entirely. The vision before as well as after treatment was 1.0. It is possible that there was an exudative detachment of the chorioid. Among the other cases, there was one distinct improvement shown by an increase of vision from fingers at 1 meter to 0.2 with −16 D. Four times a slight increase in vision (up to fingers at 4–5 meters) or improvement in the visual field could be seen, while the rest of the cases showed either no improvement or a distinct retrogression.

Although not strictly included within the realms of this communication, I wish to insert a few brief generalities about these cases of retinal detachment because of their influence upon the conclusions drawn from operative interference.

Fourteen cases resulted from perforating injuries (three were myopic), while in three cases (5 eyes), extraction of the lens with vitreous loss was the chief cause. In one of these latter, however, there was a high grade of myopia (Case No. 60). In two further cases, a tumor could not be positively excluded. In the remaining 99 cases, the second eye was emmetropic or only slightly emmetropic, otherwise normal in 22. In 12 further cases the second eye was myopic to a minor degree, but otherwise normal and with good function. In 34 cases, the second eye had been injured by a retinochorioiditis of the high myopic type (V equaling fingers to at most 0.3). In 11 cases there was a bilateral amotio retinæ; in 12 cases, cyclitic cataract; twice phthisis following amotio; and twice blindness following traumatic iridocyclitis. There were three further cases of blindness resulting from a severe vascular disturbance of the retina (highly myopic), and four from degeneration of the cornea after parenchymatous keratitis and chronic glaucoma.

Thus we see that in 25% there was a bilateral detachment, two of which were emmetropic, while the rest were myopic to a high degree. There exists thus the probability that a retinal detachment in a myopic individual will become bilateral in over one-fourth of all cases. This percentage is thirteen times greater than in the case of emmetropia.

The frequency of blindness from cyclitic cataract following detachment of the retina speaks to a certain extent for the value of the treatment. For, with but one exception, none of these eyes had been previously treated.

In the 110 eyes with non-traumatic detachment of the retina, in which the refraction could be determined, only 23 were nearly emmetropic. As 87 were myopic, we have a subsequent relationship of one to four. Tears or solution in continuity could be found in 17 eyes (13%), but in many cases the vitreous was so dense that a careful examination was impossible.

In only one case was there a large tear in the detachment in the neighborhood of the ora. In the majority, the defect was in the nature of a small hole. A long time ago, I was able to prove (5) that tears in the retina appeared at the beginning of the detachment, resulting from irregular adhesions between the chorioid and the retina, which were forcibly torn apart. A series of observations upon these cases has convinced me of the actual occurrence of such retinal tears, which have also been proven by the anatomical examinations of Treacher-Collins (6). Dimmer (7) also showed another way in which these defects appear; that is, as a result of an already detached portion. In several cases, I was able to observe directly the formation of these defects in the detached retina; in one portion of the gray retina, an area would become more transparent, the red color of the fundus would be visible, and within a few days a defect in the form of a hole would be found. This did not always occur where the retina was under particular tension. These were in the form of round hole-like defects and never a slit, so that I believe that their existence is dependent upon a solution of the retinal tissue. The thought naturally presents itself that albuminous decomposition products appear in the stagnant subretinal fluid and that from these there results a tissue-solving proteolytic action upon the retina (autolytic ferments).

Other etiological factors prove to be nephritis, arteriosclerosis of a high degree in two cases, and syphilis in three. Two of the patients had passed through a keratitis parenchymatosa, while in two other individuals (3 eyes) there have been repeated attacks of iritis due to diabetes. Among the cases conservatively treated were two diabetics. There was a congenital iridochorioidal coloboma in one eye, while in several cases (3 emmetropic) the detachment followed immediately upon a febrile disease (dental periostitis, appendicitis, influenza). Cysts in the detached retina were found, ophthalmoscopically, in one case.

I wish to call attention to a clinical feature appearing during the course of the detachment first described by Schnabel (2). Although this has not received much attention in the literature, still in 1908 Lauber (3) went into details, and even Deutschmann (4). In rare cases of spontaneous detachment of a high degree, the eyeball suddenly becomes mushy; the anterior chamber very deep, and the lens and iris tremulous, the latter discolored to a yellowish green. Several times during the conservative treatment of a detachment, we were able to observe this phenomenon; also in the intervals between operative procedures. It appears to be independent of the latter and usually disappears within a few days. The most plausible cause is that, by a sudden contraction of the vitreous framework, vitreous fluid is pressed through the posterior chamber into the anterior. I would not care to express my opinion as to whether this phenomenon can be attributed, as Schnabel did, as to a nerve influence. In all of the observed cases, this extraordinary process, apparently extremely dangerous, disappeared spontaneously within a few days. From a prognostic standpoint, it is of no material value.

As a rule, conservative treatment does not restore the function of the retina, with the possible exception of these few cases in which early demarcation of the detachment occurs. By that I mean, retinochorioiditic adhesions at the edges of the detachment, thus preventing further retinal separation and loss of function. From these, as well as older observations, I believe that a good prognosis can be given only when the disturbance is based upon chorioidal disease. Then the reattachment, with at least partial restoration of function, occurs within a few weeks; but, as I have previously observed (5), if the spontaneous reattachment takes place after months or years, the function of the retina is never perfectly restored.

These observations, as well as the theoretical considerations, inevitably lead to operative interference in detachment of the retina, for this supersensitive structure is bound to be disturbed by the derangement of its nutrition supply, and a certain amount of destruction will result from the albuminoid decomposition products in the subretinal fluids, as I described when speaking of acquired defects. These albuminoid products unquestionably further lead to nutritional disturbances of the lens, resulting in opacity and to secondary iridocyclitis. The observations of Birch-Hirschfeld prove that this subretinal fluid, when injected into the vitreous, causes an intense irritative effect, as was to be expected; consequently, a procedure aimed at perforation of the retina, with the idea of allowing the subretinal fluid to mix with the vitreous—if this has not already occurred as the result of defects—does not seem logical to me.

Not alone is secondary cataract and iridocyclitis to be regarded as the result of the albuminoidal decomposition, but also the peripheral retinochorioiditic stripes of demarcation. These must be considered as a valuable asset in that they prevent spreading of the detachment. They probably have the same origin as the subsequent retinochorioiditic stripes of reattachment.

From these figures, we can see that the prognosis in a case of unilateral retinal detachment, with fair function of the second eye, is not as poor as it was formerly believed to be. The frequency of bilateral involvement was mentioned above. Now we may consider the results of operative interference, which, although not brilliant, still were of great value in the cases where second eye was blind from iridocyclitis and cataract.

1. Puncture of the Retinal Detachment.

Punctures were performed in various manners. In those cases of sufficiently prominent eyes a broad cataract knife or a keratome was introduced through the conjunctiva near the equator and continued through the sclera slightly to one side. When possible, the puncture was made underneath the greatest prominence of the detachment, usually below (to one side of the meridian line). The instrument was turned and the subretinal fluid was allowed to run out.

In a greater number of cases, a Rectus, usually the inferior, was temporarily detached.

Only in 3 cases did I follow the method advocated by Sachs (1) (after tenotomy of a Rectus, puncture near the posterior pole of the eye). I discarded this procedure, because it offered no great advantages and because in one case it was followed by a terrific hemorrhage into the vitreous.

In a few cases, I attempted the method recommended by Fuchs (8): withdrawal of the subretinal fluid through a glass tube at the point of puncture; Mooren's method, which recently has been advocated by Birch-Hirschfeld (10) and which consisted in the withdrawal of the retinal fluid by a Pravaz syringe, was tried and discarded as well as the former. The latter procedure has the advantage that it is possible to determine accurately the amount of subretinal fluid withdrawn. We will return to this point later. In a series of cases, a pressure bandage was applied after the puncture. In another series, the eye was covered merely by a moist dressing lightly applied with a protective glass. After this, as well as other operative procedures, atropine was always used. After every operation, the patient was kept lying, and then sitting, in bed for a week and was not examined ophthalmoscopically. With the exception of two cases, in whom the puncture was combined with vitreous injection, we always expected to find a descent of the subretinal fluid into the lower half of the eyeball, provided this portion was still free.

Twenty cases (1-20) were treated by simple puncture; 6 showed marked improvement while 1 was cured (Case No. 13, watched two and half years). Three bad results followed—hemorrhage into the vitreous—while eight remained unchanged—that is, followed the usual course of retinal detachment and became eventually blind.

From a percentage standpoint, the results would seem to be wonderfully satisfactory; but the statistics become reversed when we include the cases where simple puncture was unavailing and recourse had to be made to more severe operative procedures; but it may be said that simple puncture seldom causes harm, frequently causes a slight improvement, and only exceptionally results in a reattachment; partial reattachment following puncture is usually only temporary. The only frequent complication following puncture is the one that is encountered so often in punctures of all sorts—vitreous hemorrhage. But that this is not always followed by deleterious results is shown by Case No. 28.

Only in occasional cases does vitreous hemorrhage immediately follow the operation. As a rule, the patients give the history that the vitreous hemorrhage appears 2–5 days after the operation even in eyes with normal tension. The patient declares that the eye became suddenly blind, accompanied by slight pain, although on that day vision was still existent. We have to rely upon these statements as the patients invariably lie or sit in bed following operation, and are not examined ophthalmoscopically for at least a week.

I could not convince myself of the value of a pressure bandage, either alone or following operation. It was to be expected that vitreous hemorrhage would be prevented by the bandage, but this did not prove so. Consequently, during the later years, I have avoided the use of a pressure bandage following operation for retinal detachment, all the more in that unpleasant folds in the cornea frequently appear in the hypotonic eye.

Even in cases where no vitreous hemorrhage appeared, the puncture was almost invariably followed by a marked increase in the vitreous opacities. These, as well as the hemorrhage, were usually beneficially influenced by subconjunctival injections.

It seemed of great importance to me to attempt to find the cause of the reattachment in those few cured cases, but my attempts were unavailing. It did not seem that the adhesion between the retina and chorioid at the site of puncture, which later became visible ophthalmoscopically, had any marked influence upon the farther course, for in many cases I saw the retina, previously intact, reattached at the site of puncture and detached in surrounding areas. It is more likely that the beneficial effect of puncture is simply the removal of the subretinal fluid, whose destructive influence is not negligible, and thereby allowing an easier resorption of the remainder.

Consequently, I did not deem it advisable to perforate the retina, especially in those cases where no perforation existed. This was the reason that I discarded the Deutschmann puncture, which I used ten times during the period under discussion and from which I obtained no better results than from simple puncture.

2. Puncture and Cautery.

I attempted puncture with cautery by two different methods. The first was that highly recommended by Dor (1), although I varied his technique in that I used the galvanocautery, instead of the hot iron. The conjunctiva was freed at the site of operation over a large area and immediately after the puncture the surrounding sclera was cauterized. After a few cases, I discarded Dor's method of repeated cautery through the conjunctiva because of subsequent adhesions, but even more because of my skepticism regarding his claim of the formation of adhesions between the chorioid and retina.

On the other hand, I have practiced extensive cautery immediately after puncture. I was led to this by the writings of L. Müller (1) who believed that a decrease in the extent of the scleral surface would simplify the reattachment of the retina. Therefore, by extensive cautery, I endeavored to reduce the size of the sclera.

The bulbar conjunctiva was extensively incised—either concentric to the limbus or radially. A Rectus (lateral or inferior) was detached and then an equatorial puncture was made. Immediately thereon, a wire or Paquelin at low red heat was used to cauterize the sclera over an area 10–20*mm* long to 5–10*mm* wide, so that the shrinkage compensated for the loss of tension of the eye caused by the discharge of the subretinal fluid.

I performed puncture and cautery 42 times on 30 eyes of 27 patients.

Only ten eyes were treated alone by puncture and cautery, and of this number one has remained cured for six years (Case No. 28). In four eyes, temporary improvement could be noted, and in the rest no change. In three, the symptoms were markedly aggravated, among them two vitreous hemorrhages. The majority of these cases were operated upon by ordinary methods subsequent to the failure of this type.

Case No. 28, the one healed case, was a detachment following recurrent iritis due to diabetes; the other eye was blind from a previous detachment.

It is scarcely necessary to emphasize that cure of a retinal detachment is not identical with restoration of function. As a rule, the detached portion loses its function and the remainder of the retina is functionally somewhat damaged.

Based upon these observations, I have been impressed that extensive cauterization as well as punctate cauterization exercises no marked change beyond that obtained from simple puncture. At any rate, I could not convince myself that adhesive inflammation of the chorioid followed cautery, if indeed it played any rôle in the reattachment of the retina. Moreover as this procedure is very painful, I abandoned it.

3. Scleral Excision of L. Müller (Cases 37–49).

I performed scleral excision, according to Müller's original description (1), on eight eyes (2[1]). Seven were myopic to a high degree, and one nearly emmetropic (exact refraction impossible to determine because of nuclear cataract). In two eyes, extraction was performed; six of these cases showed marked improvement, but only two of them appeared to be permanent. In one of the two, there was a complete reattachment observed for several years. In only one case was the detachment fresh (four weeks old), although the vision had dropped to only hand movements (Case No. 49); in two cases, the condition had existed for four months; in another, six months, and in another, ten months; while the rest varied up to five years.

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[1] Again this year on three eyes. In one of them, a reattachment occurred in ten days and remained during the period of observation, three months (detached for seven weeks).

In only three eyes was the scleral excision performed as a primary operation. In three cases it was preceded by a simple puncture, in another case three punctures with cauterization, and in another puncture and Deutschmann section.

In the case where it had existed four months, no improvement could be seen, but there appeared a complete separation of the retina on one side at the ora. In this case, a preliminary puncture was unavailing (Case No. 48); the second case that showed no improvement (45) was also preceded by a futile puncture. Here the second eye was blind from detachment and cyclitic cataract. I have already mentioned the fact that the poor result in the primarily blinded eye led to a poor prognosis for the second. In none of the cases was the other eye normal. In three there was a high myopia with a chorioiditis and a maximum corrected vision of 0.3. In three others, there was detachment and cyclitic cataract (one enucleated); and in two, the second eye had been damaged to a severe degree by previous detachment. With these factors in mind, we must consider a slight and not always permanent improvement in six out of eight eyes operated by scleral excision, an unexpectedly good result.

But the results were not so good in the eight cases upon which I attempted a modification of the Müller operation. I was led to attempt this modification by the following facts: the Müller scleral excision absolutely demands complete narcosis, because of the necessary invasion of bony tissues, and only in deep narcosis is the Bell phenomenon lacking (probably also in scopolamine—Twilight Sleep with light narcosis—but this anæsthesia was not known at that time). Therefore the patient had to be deeply under the influence of the anæsthesia in order to keep the eye easily in the median position. My modification could be practiced under local anæsthesia. The excision (meaning thereby, the suture) is easier the thicker the sclera is. Myopic eyes, which form the majority of cases for this operation, practically always have a thin sclera in the equatorial region; whereas the anterior portions of the sclera, especially in the neighborhood of the insertions of the Recti, are usually of normal thickness. Another factor that renders the operation easier is the thickness of the uvea, thereby avoiding the not infrequent complication of rupture of the chorioid, alone or with retina. All these factors led me to make the incision in the anterior segment of the eye, making the anterior incision 2–3*mm* in front of and the posterior 5–8*mm* behind the insertion of the external Rectus. This brings the operation in the area of the detachment. In one case (No. 37) upon which a Müller had already been performed, there entered one other factor which seemed to me to be of importance, viz., the desire to perform the excision in the immediate area of the detachment. For, if the lower half of the retina is detached, while the upper half remains in place, it would seem rational to perform the excision in the lower half of the eye; but my results have not proven this contention.

I operated upon seven eyes in six cases (six of the seven were myopic) by my modification and obtained a marked improvement in five. Among them was Case No. 37 in which the Müller–Elschnig had been preceded by an original Müller. One of them had been punctured three times without visual improvement; in one, vision was improved from finger counting at half meter to fingers at six meters. In this case, a puncture was performed later which resulted in a complete detachment of the retina. We observed another case for two years during which time vision rose from practical amaurosis to finger counting at one meter (Case No. 42). The patient was practically emmetropic and the disease had existed for nearly a year.

In two cases, the eye became worse; in one, there had been a preceding puncture. The disease had existed only a short time in both of them. The second eye of one case had been suffering from detachment of the retina for nearly five years and had been operated upon according to the original Müller procedure. The expectations which led me to the modification did not completely materialize; the chorioid in the ora region is not always sufficiently resistant, especially in cases of detachment of the retina, to bear the vitreous pressure. (This is probably increased by grasping the sclera with instruments; for I had in one case, a rupture of the chorioid with loss of vitreous.) But of more importance is the fact that never did an iridocyclitic follow an original Müller, while, with my modification, I had two cases of marked plastic iridocyclitis, Nos. 40 and 44. These were certainly not infections, for the customary preliminary examination of the conjunctival sac proved it to be sterile.

It was rather noticeable that here, as in untreated detachment of the retina, the tension remained somewhat subnormal for a considerable period of time. Only once did I observe the phenomena I previously described—sudden deepening of the anterior chamber and marked tremulousness of the iris and lens (Case No. 44). In every case, the anterior excision produced a more complete anæsthesia of the cornea than did the Müller, but I never observed any subsequent injury that amounted to anything. Once, a temporary "thread keratitis" followed an original Müller (Case No. 49), but epithelial changes are prone to follow operative procedures on prominent myopic eyes, and it is very possible that the cornea was not sufficiently guarded during the course of operation.

My operation resulted in much more marked deformation of the bulb. The original Müller caused a marked change in the radius of curvature of the cornea, but nothing like the high degree of astigmatism resulting from an anterior scleral excision. I am unable to give exact figures, for the poor central fixation forbade exact measurements. The angle gamma was usually doubled by either of the operations and became equal to 10–13 degrees. This resulted in an apparent marked strabismus. There was one other cosmetic disfigurement and this was the apparent enophthalmus.

These observations led me to discard my modification in favor of the original Müller equatorial scleral resection.

In the first cases, I preceded the operation, according to Müller's instructions, by a Krönlein resection of the lateral wall of the orbit, but as Czermak (1) has shown, the scleral excision may be done without this preliminary step, provided the bulb is prominent. Among the later cases, even with sufficient prominence of the eyeball, I performed a definite resection of the protruding edge of the lateral wall of the orbit by means of the Lüer forceps or the electric-driven burr, after the periosteum had been freely dissected away. This procedure is simpler than the Krönlein, and the field of operation is more freely exposed, for the skin-and-bone flap is not constantly intruding itself. After the scleral excision is finished, the periosteum and the skin wound are sutured and not the slightest deformity follows the primary union. An equatorial scleral flap 25*mm* long and 8–10*mm* wide seems to yield the best results. Following Müller's advice, I had been in the habit of preceding the resection with two or three sutures. I excise the flap about 2*mm* at a time, preceding the excision by a suture, inserted at the point where the excision stops. This is tied as soon as the sclera is cut through, and the gap intervening between this and the preceding sutures is closed by other sutures as rapidly as possible. Thus the premature rupture of the chorioid is hindered.

In cases in which a puncture has preceded the operation, the chorioid is apt to be adherent to the sclera, and, unless this adhesion is carefully freed, an untoward tear of the chorioid may occur easily.

In several cases, there was a passing disturbance of motility, occasioned by paresis of the external Rectus. A fixation of the externus onto the lateral orbital wall occurred in two cases, although great care was taken to keep the muscle and periosteum separate.

I was able to draw the following conclusions from my observations of excision of the sclera in retinal detachments: the operation is practically without danger; small excisions because of the shorter period of operation and because of the lesser damage to the uvea in the operated field seem to yield more favorable results than the extensive ones.

A skilled operator with skilled assistants should be able to perform the operation in thirty-five to forty minutes, in cases of thin individuals with an orbit fairly free from fat.

4. Puncture with Vitreous Injection.

Theoretical considerations similar to those that directed the experiments of Deutschmann, as well as practical experience that I had had before the beginning of these investigations, led me to the combined therapy of retinal detachments.

It was easily conceivable that the beneficial effect of the removal of the subretinal fluid was restricted by the enormous hypotonicity and the resultant vitreous hemorrhages; therefore, I first tried pressure bandage after puncture and then subsequent extensive cauterization, in order to cause a return of normal tonicity, as Müller attempted by his scleral excision.

As all of these attempts came to naught, I passed on to a vitreous injection. In addition to the above mentioned viewpoints, there were two further considerations that urged me on. First, a permanent reattachment should be easier to bring about by increasing the vitreous pressure, *i.e.*, the vitreous volume, as has been repeatedly done (see literature). Second, that in those cases, with limited communication with the vitreous chamber and the subretinal spaces, osmotic processes between the fluids of these spaces could lead to an increase of the detachment. (This is in accordance with the Rahlmann theory.) This idea received a firm support from one of the earlier cases (28) in which a permanent reattachment followed a single puncture, as a result of an extensive hemorrhage into the vitreous.

On the 12th of February, 1908, I followed the usual puncture of a retinal detachment with injection into the vitreous of 1*cc* of autogenous blood serum. The subsequent dense opacity of the vitreous was expected, *a priori*. After further experiences with this procedure of vitreous replacement (9), I attempted it in other cases of retinal attachment. For this purpose, I operated upon six eyes with extremely dense vitreous opacities or hemorrhages. In some, I used a salt solution of hypertonic strength (up to 0.95). In regard to the vitreous replacement, results seemed to be good; but the detachment, as far as it could be determined because of the dense opacities, did not seem to be markedly influenced. As these cases present nothing interesting, I shall not publish them in detail; nor a case of detachment following perforating injury that was completely cured by a single vitreous injection. This latter can be found in my work on Vitreous Replacement (9).

From the 30th of June, 1909, on, I combined the puncture with an injection of 1*cc*, or less, of physiological salt solution into the vitreous in three cases. The salt solution was introduced into the vitreous through a cannula that entered laterally in the region of the ora, simultaneously with, or immediately after, the incision of the sclera and chorioid with a cataract knife or keratome. After the appearance of Birch-Hirschfeld's publication (10), I adopted his procedure, but only once did I follow his advice of injecting a solution of nine parts of normal salt with one part of subretinal fluid. Iritis with hypopyon was the result in No. 55.

In two cases (Nos. 37 and 58) I mixed the fluid for injection with autogenous serum in the proportion of 10–1, in order to attain as nearly as possible the normal constituency of the vitreous, but denser opacities resulted from this than from the use of albumen free fluids.

In several cases I used Tyrod's fluid,[1] but this does not appear to have any advantages over the normal salt solution; moreover the red color is slightly disturbing.

I did not attempt the injection of sterile air into the vitreous, for the use of normal salt seemed more rational. In my work on replacement of the vitreous (9), I objected to the use of more than 0.5 to 0.6*cc* as severe iritic disturbances could easily follow; but I believe that these can be completely eliminated by making the solution of *freshly distilled water* analogous to the elimination of fever after an intravenous Salvarsan injection. Still the use of 1 or ½*cc* fluid is not negligible, but we must also consider the fact that iritis can appear after any operative procedure, even simple puncture, and frequently appears spontaneously during the course of an untreated retinal detachment. Birch-Hirschfeld (10) maintained that the subretinal fluid should be withdrawn as completely as possible under ophthalmoscopic control, even in cases where no visible perforation of the retina is present—as much as 3*cc* of fluid could be withdrawn without reattachment. I did not attempt ophthalmoscopic examination during the operation because of the extreme optical axis necessary for an equatorial puncture. On the other hand, the position of the cannula in the vitreous can be watched in every case by the operator or by assistants with the aid of an electrical head-lamp.

In the operation as proposed by Birch-Hirschfeld, it is not always possible to perforate the retina after withdrawal of the subretina fluid, even if incomplete. In these cases, a second cannula had to be forced into the vitreous through another portion of the ora region, in order to make the injection possible. During this procedure, I once injured the lens; consequently in the later cases, I inserted two needles simultaneously, although in different locations—one to withdraw the fluid and the other to inject into the vitreous.

I do not believe that the collapse of the eyeball, consequent upon withdrawal of a large amount of fluid, and the subsequent necessity of injection of an equally large amount of fluid, is of negligible importance to the integrity of the diseased eye. Consequently, I agree with the opinion that Birch-Hirschfeld expressed at the last Heidelberg Congress (1913), that not more than 1–1½*cc* of the subretinal fluid should be withdrawn.

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[1] Neukirch, *Arch. f. d. ges. Physiologie*, vol. cxlvii., 1912.

In the one case (No. 63), the resultant cataract must be ascribed to the technique and not to the type of operation. In one further case (No. 56), the eye was lost by a saprophytic infection, despite the strictest aseptic precautions. The unsatisfactory results in the other cases must be ascribed to the abnormally large amounts of fluid evacuated and injected.

This procedure was carried out on twenty-two eyes of nineteen patients; in one eye, twice, and in two eyes, three times; twenty-six times in all. Among these cases, the detachment was due to trauma in two, following extraction with vitreous prolapse (No. 55), one; once after recurrent iritis (No. 54 myopia); once after keratitis parenchymatosa; and once in a myopic eye following extraction and discission performed at another clinic (No. 60). In this last case, a puncture of the primarily diseased eye resulted in a complete loss of vision. Of the remaining thirteen eyes, six were myopic and seven practically emmetropic.

In six cases, other operations, aimed at the retinal detachment, had been practiced.

Seven eyes, in five cases, were improved (four highly myopic, one slightly myopic, and two emmetropic). The slightly myopic eye (No. 57) was observed seven months and retained a visual acuity of 0.2. In five cases, the improvement was slight, but only temporary (two myopic and three emmetropic). In ten eyes, the deterioration continued. Among those were detachments following extraction of traumatic cataract, following keratitis parenchymatosa, and following recurrent iritis. The poor results—two cases—were due, not to the method, but to the technique (No. 63, traumatic cataract and No. 56, saprophytic infection). Of the seven remaining poor results, two eyes were emmetropic, four highly and one slightly myopic.

In seven of the cases, the cause of the poor result was a vitreous hemorrhage, and in all of them, large amounts of fluid were withdrawn. In one case, the detachment was in the upper half. In one case, there had been three preceding punctures and cauterization, and in one, only one puncture.

In none of the cases was there a complete reattachment of the retina.

Although my material is too small and partially useless in that I followed Birch-Hirschfeld's directions in too many cases of withdrawing too much fluid, still I believe that I am justified in assuming that puncture, with simultaneous injection into the vitreous, will prove a valuable addition to our armamentarium. But I do not believe that greater statistics will fulfill the hopes aroused by wonderful results published by Birch-Hirschfeld.

I would summarize my observations as follows: Operative treatment is indicated in all cases of detachment of the retina that do not yield to conservative treatment within six weeks. As a possible exception to the time limit might be mentioned those cases wherein iritic irritation appears a short time after the detachment has occurred. But I do not include the cases of detachment following an old iritis.

The operative procedures that come under consideration are: scleral puncture with injection into the vitreous; and the Müller scleral excision. The less severe procedure should be attempted first, and, if unsuccessful, should be repeated without too great an interval of time intervening. If still unsuccessful, the scleral excision should be carried out. Only in those cases in which large tears in the retina are visible should a primary scleral excision be attempted. Operative interferences should not be undertaken too close together; at least six weeks should intervene. Post-operative irritations of the iris or opacities of the lens should be blamed upon the technique—not upon the method.

Iron-bound operative indications and prognoses cannot be established, however, until the causes of detachment of the retina are absolutely confirmed.[1]

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[1] Owing to lack of space, the report of the cases will be omitted. For these details, the reader is referred to the original publication.

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A METHOD OF PRESERVING MACROSCOPIC EYE SPECIMENS IN THEIR NATURAL COLORS.

By Professor R. GREEFF, Berlin.

Translated from the *Arch. f. Augenhl.*, Vol. LXXVI., 1914.

WE often wish to preserve macroscopic specimens of eyes. A number of methods have been suggested. Preservation in Müller's fluid or in alcohol has been abandoned because the tissues change in color, the colors are entirely lost, and nothing remains but the contours.

An excellent method is the one devised by Priestley Smith (*Ophthalmic Review*, March, 1883). This consists in the use of gelatine. An eyeball which has been preserved in alcohol is divided. One half can be used for microscopic examination, the other is subjected to a 10, 25, and 50% solution of glycerine for one day each. This prevents contraction when the specimen finally comes into the gelatine. The eye is preserved in a specially constructed little glass vessel which is filled with fluid gelatine. No air bubbles should be admitted and the specimen is held in contact with the glass bottom of the little jar until the gelatine has become hard. The jar is then closed by glueing on a plate of glass. Instead of a flat bottom to the glass jar, the glass has been ground to a plano-convex shape which magnifies the specimen and is the method now in use at Moorfields Hospital.

The disadvantages of this method consist in that the colors are not preserved and in the course of years the gelatine becomes fluid and the specimens are spoiled. Nettleship made a slight modification which did not entirely remove these objections.

Another excellent method is the dry method. The eyeballs are fixed according to any method and then hardened in alcohol, divided according to the desired shape, then placed in absolute alcohol which is changed until the specimen is water-free. Then it is placed in pure turpentine oil for eight days until the specimen becomes transparent. The specimen is then placed in a bowl which is partly covered and the turpentine is allowed to evaporate slowly, until the specimen is quite dry. It is then placed in a glass jar to protect it from dust. It is very difficult to prevent subsequent shrinkage and the method is suitable only for a few specimens.

Hardening in formalin has certain advantages, as in this agent the cornea remains transparent, but the lens clouds. I made use of formalin and suggested a method in 1898 which is published in my book on *The Microscopic Examination of the Eyeball.* The method consists in placing the eyeballs in small flat jars. The eyeball is hardened and then divided antero-posteriorly. It is then placed for a few minutes in distilled water. The specimen is then attached to the inner wall of the glass receptacle with some warm eating gelatine. After from one to two minutes when the glue has become stiff the vessel is filled with alcohol or formalin solution. The top of the glass is then fastened to the upper edge of the glass jar with warm rubber adhesive material and care must be taken that no air collects. On the top of the glass jar we place the label of the specimen.

This method has found favor and has seemed serviceable. Most colors are preserved, especially the tapetum in the choroid of some animal eyes. The bright iridescent color remains for years. Unfortunately, blood pigment is not preserved and many specimens present a different appearance from that which is natural.

The Kaiserling fluid has the property of preserving the color in blood tissues. A new epoch began in a number of pathological museums from the day of the use of this method. It has been used to preserve eye sections as follows: The eyeball is first placed in solution 1:

500 distilled water
100 formalin
10 acetate of potash
5 nitrate of potash

for twenty-four hours. Generally there is a decided shrinkage. It is therefore well before placing the specimen in this solution to inject some of the solution into the vitreous chamber. After twenty-four hours the eyeball is divided with a broad knife, the vitreous is carefully removed with a small brush, care being taken not to injure the retina. The eyeball is then placed in 70, 80, and 90% of alcohol for ten minutes each. It then comes into the final solution, the Kaiserling preserving fluid, which consists of:

1000	distilled water
100	acetate of potash
100	glycerine.

This method preserves the important blood pigment. The normal eye-ground has an entirely different appearance: the vessels of the retina are red and the choroid pinkish. A retinal hemorrhage or the hæmophthalmus preserve their color beautifully. Unfortunately experience has shown that this method is not very serviceable, for it seems difficult to keep the eyeballs from shrinking, and much valuable material has been lost. I have therefore abandoned this method entirely and prefer Pick's solution, which also preserves the blood pigment. The eyeballs are first placed in the following solution: artificial Carlsbad salts 50; distilled water 1000; formalin 50. In this solution the eyeballs remain for from twelve to twenty-four hours. It is advisable to inject some of the fluid into the vitreous chamber. The eyeball is then divided and the half to be used for macroscopic purposes is placed in 70 and then 80% alcohol for ten minutes and finally in 96% alcohol for a half hour. The eyeball at last is placed in Pick's preserving fluid:

500	distilled water
150	sodium acetate
250	glycerine.

Recently the following modification has seemed the best to me. The eyeball is hardened for from twelve to twenty-four hours in 5% formalin solution. Then it is divided and placed in alcohol. The formalin causes a certain amount of the coloring material to be lost. If it remains in this solution not longer than twenty-four hours, the color can be obtained again when the specimen is placed in alcohol. The eyeball is then placed for ten minutes in 70 then 80% alcohol, and finally for half an hour in 96% alcohol, and then in Pick's preserving fluid.

Before placing it in this solution, the specimen should be glued fast in a suitable glass jar. The back surface of the eyeball is placed for a few minutes in distilled water. This is the surface which is to become glued. It is then carefully dried. A little eating gelatine is dissolved in a glass and the specimen is glued by means of this to the glass wall or to a milk glass plate on which the eyeball is to rest. Instead of gelatine, we may use warmed Kronig's material. After a minute or two the specimen is usually dry. The vessel is then filled with a preserving fluid and the margin of the glass and the top are stuck together with the adhesive mixture. Care must be taken that no air is admitted.

I wish to state in conclusion that the experimentation with these various methods was to a great extent the work of my laboratory servant, Wittke, and that the favorable results are to a great extent due to him.

DEPARTMENT ON CONSERVATION OF VISION.

By Dr. GEORGE S. DERBY and Mr. HENRY COPLEY GREENE,
Boston.

PUBLIC School Classes for Children with seriously defective eyesight offer a hopeful opportunity to oculists and lay workers for the conservation of vision. Such classes have been successfully started in Mülhausen and Strassburg in Germany; Birmingham and London, England; and Cleveland, Milwaukee, and Boston in the United States. In New York and Chicago the public school classes for blind children have included a few pupils not blind but with very low vision; and the comprehensive development of these classes, so as to provide for all New York public school children with seriously defective sight, was planned by the late Gertrude E. Brigham, Inspector of Classes for Blind Children in that city.

The standards of vision in the classes about which we have secured definite data on this subject are as follows:

	No. of Pupils.	Standard of Vision with Glasses.
London[1]	313	$\frac{6}{18}$ to $\frac{6}{24}$; 5 D. to 15 D. Myopia.
Cleveland	28	$\frac{6}{12}$ to $\frac{6}{20}$.
Strassburg	21	Less than $\frac{20}{100}$.
Boston	17	$\frac{20}{70}$ or less, with exceptions up to $\frac{20}{40}$.
Chicago		"Nothing like $\frac{20}{70}$," *i. e.*, much lower.

The causes of visual defect among children are of interest especially in their bearing on methods of teaching. For example, where myopia preponderates, the pupils' capacity for distinct vision at very short distances must be considered, while the children's inability to see distinctly, even at the shortest distances, must be considered in classes, like that at Strassburg, where opacities of the cornea preponderate. The types of cases in London, Cleveland, Strassburg, and Boston may be compared, in approximate percentages, as follows:

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[1] "The Education of High Myopes," by N. Bishop Harmon, F.R.C.S., the *Braille Review*, September, 1913. This report covers the period from the foundation of the experimental class in 1907 to the end of 1912. In August, 1913, there were three classes in London with total accommodations for 103.

	Per cent. Due to Each Cause.			
	London.	Cleveland.	Strassburg.	Boston.
Total Cases	313	28	21	17
Congenital Cataract	1.9	25.	28.	12.
Other Congenital Disease or Defect	4.2	4.	19.	6.
Interstitial Keratitis	7.7			24.
Ophthalmia Neonatorum and Purulent Conjunctivitis	4.2			
Superficial Keratitis	16.0			
Corneal Opacities		18.	43.	12.
Choroiditis and Iridocyclitis	2.6	7.		
Myopia	62.7	18.	10.	24.
Hypermetropia	.1	7.		6.
Miscellaneous	.6	21.		16.

Salient features of the London classes are: (1) that the pupils are not taught Braille; (2) that they are not allowed to read ordinary books, special large type sheets being substituted; (3) that knitting, if held near the eye, and needlework are prohibited; (4) that writing, arithmetic, reading, and a few manual occupations are taught in the "Myope Classes," and that (5) the pupils attend the regular public school classes for all oral lessons, drill, singing, wood-working, cooking, and laundry work.

The Boston School Committee opened its Defective Eyesight Class with five pupils in April, 1913. A teacher of proved capacity and resourcefulness prepared herself, among other ways, by making fonts of heavy black letters gummed on to individual cards, and large maps having coarse outlines and states or countries in color. She collected numerous appliances and materials, desk looms, spool knitters, wooden knitting needles, wool, reed, cane, etc.; for her appeal was to be through the eye and hand as well as through the ear. The teaching is necessarily individual. Each child is dealt with according to his defect and advancement. Superintendent of Schools Dyer says of this class in his annual report for 1913: "The progress made by the children, to whom school had meant almost nothing, has been remarkable." In the first full term, during the next winter, the class had seventeen pupils. In its third season, it now has eighteen; and preparations are on foot for the opening of a second class. Meantime an important early lack has been filled by Dr. Elwood T. Easton's regular supervision of the pupils' ocular condition.

The following address,[1] by Dr. E. Redslob, translated with some abbreviations from the original German, shows the methods and purposes of his admirable class in Strassburg.

SCHOOLS FOR CHILDREN WITH DEFECTIVE EYESIGHT.

(By Dr. E. Redslob, Oculist.)

Side by side with the growing demands which school training makes upon our children, has grown the care for their physical welfare. In most cities school physicians have been installed and almost every large city has its school oculist. I should like to make you acquainted to-day with a new social institution which has been maintained for three years in Strassburg. This is a *public school class for children with defective eyesight.*[2]

How did the need arise for establishing such a school? Pedagogical and hygienic considerations both came into play here. In public school classes, the teacher cannot give special attention to the cases with seriously defective vision. Such children, therefore, have the greatest difficulty in keeping up. From the standpoint of medical hygiene, moreover, it is extremely desirable that children with defective vision should spare their weak or diseased eyes as much as possible.

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[1] "Ueber Schulen für Schwachsichtige," *Strassburger medizinischen Zeitung*, 1 Heft, 1914.

[2] In the discussion of this address Privy Councillor Professor Axenfeld of Freiburg asked whether this school were a benevolent institution. Here in Strassburg the School for Children with Defective Vision is a city school. It is part of the public school system, and is under the supervision of the circuit school inspector. The teacher was taken from the middle (intermediate) school. In order to be effective the school must stand on a strong footing. This is the case only when the community is responsible for the administration and the running expenses.

What children are included in the class of visual defectives? To be successful, the number of pupils per class should be limited. The teacher must know each of his pupils; he must proceed on strictly individual lines, according to the grade of visual defect and of mental capacity. This is the prime requisite.

What children are to be picked out of the mass as visual defectives? Defective vision is a very vague concept. The same degree of defect, scientifically speaking, does not determine equal degrees of handicap in different children. Many people can turn their remnant of visual power to much better account than others. Intelligence and a certain inborn skillfulness come into play. Although I was well aware of this, it was necessary in the beginning to proceed on a strictly numerical basis. It was therefore decided to admit only children in whom the corrected vision of the better eye was less than $\frac{20}{100}$.

It was found that out of the 21,000 public school children of Strassburg about twenty fulfilled these conditions—that is, about $\frac{1}{10}\%$. Two, however, were very weak mentally, so that they were placed in the special class (for mental defectives). For if children with defective eyesight are further afflicted with feeble-mindedness, the mental defect above all else must be taken into account in their training.

In the course of time children were added whose vision somewhat exceeded $\frac{20}{100}$, when their teachers certified that progress was prevented by their poor eyesight. The class now also takes in children who have somewhat better vision, but are suffering from recurrent inflammation of the eyes. Thus in the course of time, the number of pupils in the Class for Children with Defective Eyesight rose to twenty-two. To admit more children to one class would defeat its purpose.

What eye-diseases lie at the basis of the visual defects of such children?

In nine children there was found corneal opacity following scrofulous ophthalmia.

In two children, high myopia.

In four children, cataract (part operated, part inoperable).

In one child, dislocated lenses.

In one, congenital aniridia, with cataract.

In four children, nystagmus and congenital amblyopia.

Corneal opacity and congenital defects, therefore, play the chief part in the extreme defects of vision of school children.

How is this Class for Children with Defective Eyesight conducted?

At present it still consists of a single class, where children of all ages from six to fourteen are taught by one teacher. The instruction is not according to the usual plans for teaching normal children. Since their remnant of vision should not be greatly taxed, it is much more difficult to impart sensory concepts to them. In all the school exercises the teacher seeks to work more upon the ear than the eye; and the other senses (touch and smell) are also called into play as actively as possible.

Writing is of course indispensable, but reduced to a minimum. The question whether slanting or upright writing shall be used is less important here than in classes for normal children. The significant thing is not in what style, but how long they write. Accordingly they never write for longer than ten or fifteen minutes at a time. I have tried to simplify the writing in the copy-books by introducing new books. These differ from the usual copy-books in having a wider space between the lines and in a greater distinctness in the ruling—broad black lines on white paper. According to the reports of the teacher they seem to work very well. In the first place, the children like much better to write in the new books than in the old ones. The children write more rapidly in the new books and read the writing more easily. Exact measurements show also that the head is not held so low in writing in the new books as in the old. The difference amounts to about two or three centimeters. That seems very little at the first glance; but when we consider that children with a high degree of eye-defect write with their eyes about seven to ten centimeters from the paper, an increase of two or three centimeters certainly amounts to something.

The children write a good deal with chalk on the blackboard. Writing on the blackboard has the advantage of being much larger and much easier to read. The plane of the blackboard should not, however, be parallel with the wall. It ought rather to slant, as can easily be arranged by a special contrivance. For in writing, as in reading, at a short distance, the eyes should be directed downwards; and this is not the case when a vertical blackboard is used. Investigations, the most recent of which are those of Dransart, have shown that in looking above or in the plane of the middle of the eye the angle of convergence is much smaller than in looking downward. In looking upward or straight forward in reading or writing, therefore, the eye muscles are much more quickly tired.

In order to make *reading* as easy as possible, nothing is read until the subject-matter has been already gone over and developed orally. We are preparing special reading books with large clear print and simple illustrations consisting only of the essential lines.

Drawing is done with charcoal on white drawing-paper; never with pencil; the slate, too, is very seldom used. In order to impress upon the children the form of a given object, it is drawn or modeled. Only objects with lines and surfaces which can be simply represented are used as models. In *geography* map-reading is put somewhat in the background. To illustrate surface forms, sand and clay relief maps are made.

The teaching in *natural history* and plant-study is given as far as possible out-of-doors. The children go often during schooltime for walks in the suburbs; and the teaching is related to the objects which nature presents to them. This out-of-door teaching benefits not only the eyes but the whole physical constitution. And we must not neglect this. Half of these children are afflicted with scrofulous diseases. It is owing to this circumstance that 50% of the children receive free milk from the city. In order to make attendance at the school easy, street-car passes also are distributed by the city. Home lessons are never assigned in winter, seldom in summer; for the homes of these children are often wretchedly lighted.

In the Class for Children with Defective Eyesight we are aiming not only at hygienic but social welfare. Since we cannot know whether in the future this child or that will be totally deprived of sight, we must make the pupils familiar with work by which they can earn their livelihood later. The children are therefore first of all thoroughly trained in basketry and netmaking; later are to come brushmaking and the other trades taught in the institutions for the blind. The objection may perhaps be raised that children with defective eyesight will overtax their eyes in learning handcrafts. This danger exists, however, only at first. The children are therefore told to be very careful at the beginning of the lessons in basketry. Soon, however, the work becomes purely mechanical. When the children have once mastered their work, they turn away their eyes spontaneously, or are encouraged to do so.

The school has further set itself the task of finding suitable places for the pupils when they leave, so that they may earn their bread without danger to their eyes.

I have tried to tell you, in the barest outline, of the principles upon which the teaching in the Class for Children with Defective Eyesight is founded. As far as accomplished results are concerned, we may be well satisfied. Although we cannot expect decorative penmanship of the pupils, they do learn to write and to write properly. They read and compute quickly and correctly, and when they leave the School they have reached at least the same grade as the children in the regular classes. Meanwhile their weak eyes have been spared as far as possible. One mother said of her own accord that her little daughter (M. S.) had never learned to write in the regular school, although she was not at all stupid. Since she has gone to the Class for Children with Defective Eyesight the child has done so well in a short time that she writes better than her elder brother with normal vision, who goes to the regular public school.

Such public classes for children with defective sight are as yet to be found, in Germany, only in Strassburg and in Mülhausen, where my colleague, Dr. Weinberger, in his time was so good as to make me acquainted with the arrangements. Since these schools are an entirely new institution, we cannot expect them to reach the highest degree of perfection at the outset. We must gain more experience and make more progress in the education of our visually defective school-children.[1]

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[1] In the discussion, Dr. Zade of Heidelberg suggested that the modern optical devices, the double-verant and telescopic magnifier of the firm of

The results already achieved permit us, however, to say that every one of the larger cities should have such a school for visual defectives.

Zeiss, might be employed in the teaching of children with defective vision. This suggestion will be followed to the best of our ability. I believe if the question of expense does not make it impossible we shall obtain good results with these magnifiers.

REPORT OF THE MEETING OF THE SECTION ON OPHTHALMOLOGY OF THE NEW YORK ACADEMY OF MEDICINE.

By GEORGE H. BELL, M.D., Secretary.

H. H. TYSON, M.D., CHAIRMAN. MONDAY EVENING, NOVEMBER 16, 1914.

Dr. A. Nettle presented a case of **glioma of the orbit** in a child two years of age. On August 4th, the eye was removed for glioma of the retina. Six weeks later, the process had extended to the optic nerve and had involved the orbit. When presented before the Section, the mass filled the orbit and had pushed the eyelids out so far that they were very tense and swollen. The child was under X-ray treatment.

Dr. Thomson said that he had seen Dr. Nettle's case after the enucleation, and found that the glioma had extended back into the optic nerve. It was a case of the direct extension of the disease.

Dr. E. F. Krug presented a case of **retinitis proliferans,** in a man, and gave the following history: J. A. D., age 50, has been under observation at the New York Eye and Ear Infirmary since August 12th, with a history of not having seen well with the right eye for over a year. Since June, the vision in the left eye has been failing rapidly. Patient has chronic nephritis; albumin, hyalin, and other casts; low specific gravity; blood pressure varying between 185 and 200. Is under treatment by his family physician for his nephritis.

Right eye: Hemorrhagic neuroretinitis. S. $\frac{20}{200}$.

Left eye: Vitreous full of cholesterin crystals, some very large; retinal hemorrhages everywhere; from the disk, a fan-shaped proliferation of connective-tissue bands and tortuous blood-vessels extends into the vitreous in all directions, with only small areas of clear vitreous between—the typical picture of retinitis proliferans.

Since first seen, there has been very little change in the fundus picture of this eye. The right eye has been growing progressively worse; larger hemorrhages and new connective-tissue bands and new blood-vessels are beginning to extend from the nerve head into the vitreous. The sight in this eye is now only $\frac{10}{200}$; the sight in the left eye has remained about the same, $\frac{5}{200}$. There has been some improvement in the kidney condition, and the blood pressure has been reduced to 185.

Dr. JOHN M. WHEELER presented a patient with **cystic tumor in the hypophyseal region.**

Frank C., Italian bricklayer, age 38, and married. Patient is the father of five children, three of whom are alive and well. One died at two months, and one at six months.

About two and a half years ago, the patient first noticed indistinctness of vision in the left eye. About the same time he noticed a slight protrusion of the left eyeball. No pain or headache until about three months ago, when there were severe frontal and occipital pains, lasting for two weeks. At the end of this period, patient had a day and a night of vomiting, without nausea. Has not vomited since and never has had nausea or dizziness. Mercury and potassium iodide have been administered for several months without improvement of exophthalmos or vision.

October 9th. Vision: O. D., $\frac{20}{200}$; O. S., light perception (faint). Pupils react to light both directly and consensually. Left pupillary reaction, sluggish. Exophthalmos: O. D., 18*mm* O. S., 22*mm.* Ophthalmoscope: O. D., interior normal in appearance; O. S., simple atrophy of nerve. Fields: O. D., normal for white and red, green could not be recognized; the red appears fainter on the temporal than on the nasal side. No sign of acromegaly or other trophic disturbance.

October 10th. Wassermann, negative. Nasal examination by Dr. S. L. Craig revealed a badly deflected septum. Probe could not be inserted into right sphenoidal sinus. Through left side, probe appeared to go into the cranial cavity without resistance.

On October 30th, Dr. Craig passed a cotton-tipped applicator and probe into the cranial cavity through the left side of the nose, preliminary to X-ray exposure. About half an ounce of viscid, brownish fluid dripped from the probe. Laboratory examination of the fluid showed cholesterin crystals and pus cells. X-ray plates showed probe and applicator in cranial cavity.

Dr. A. F. Holding reported from X-ray examinations: "Destruction of the bones of the internal walls of both orbits, very greatly enlarging and changing the outlines of the sphenoidal fissures; sella turcica obliterated, and posterior wall of sphenoid sinus destroyed; left frontal sinus and maxillary antrum show increased density; deviated septum and bulging outward of internal and anterior border of left orbit. The appearance suggests a tumor of the hypophysis with wide extensions. However, there is nothing in the plate to absolutely determine where the tumor is primarily."

Following withdrawal of the fluid on November 4th, vision in the right eye had improved to $\frac{20}{70}$, and the exophthalmometer readings were: O. D., 18*mm*; O. S., 20*mm*.

On November 12th, Dr. Craig removed the middle turbinate on the left side and thus brought into view an area of exposed dura.

November 13th. Vision: O. D., $\frac{20}{70}$; O. S., movements of objects. Exophthalmos: O.D., 17*mm*; O.S., 19*mm*.

Dr. M. J. SCHOENBERG presented a case of **zonular cataract at the posterior pole.** The patient was a girl, twelve years of age. The zonular cataract showed two concentric opaque rings with transparent zones around them and somewhat anteriorly one to the other, so that the entire appearance was that of a cup. Vision: $\frac{20}{70}$ in this eye; $\frac{20}{30}$ in the right eye. The mother says that the girl had a number of convulsions from the age of two to the age of ten. There was nothing else in the history of patient of interest regarding present condition. Examination of the literature revealed the fact that such cases of zonular cataract—shifted backward in the region of the posterior pole—are of very rare occurrence.

Dr. SCHOENBERG also showed a patient with **foreign body in globe.** This case had already been shown at a previous meeting of the Section. He extracted a piece of non-magnetic metal from the anterior chamber of the left eye a few weeks ago, and the iridocyclitis preceding the extraction is rapidly subsiding.

Vision improved from perception of light to $\frac{20}{200}$. The foreign body had been in the eye for twelve years.

Dr. E. S. THOMSON presented a case of **zonular opacity of the cornea.** The patient, a child of twelve years, gives no family history of importance. The von Pirquet reaction is negative; Wassermann, positive. There are extensive posterior synechiæ. It is apparent, therefore, that the iritis has either been of a very quiet type or that the period of the inflammation antedated birth. The opacities on the corneæ have been increasing, according to the statement of the patient's sister. They are quite characteristic of the zonular opacity which Fuchs describes. These opacities consist of calcareous spots of degeneration and occur, usually, in eyes which have suffered from severe iridocyclitis or glaucoma. Fuchs states that they may be scraped off if they interfere with vision. It is unusual to see a case of this type in so young a child.

Discussion. Dr. SCHOENBERG said that he had seen a case, similar to Dr. Thomson's, two years ago, where the entire cornea was involved. Some of the opacity was scraped off, but the culture was negative.

Dr. MAY asked if carbonate of soda had been tried in this case.

Dr. THOMSON replied in the negative.

Dr. H. H. TYSON presented two cases of **retraction of globe upon abduction.** CASE I. A. P., boy, age 6 years; compound hyperopic astigmatism. The child had squinted since birth; no traumatism. He was unable to abduct the left eye beyond the median line; upon adduction, the left eye recedes into the orbit 1 *mm*; palpebral fissure narrows and lids fall inward.

CASE II. R. K. girl, age 9 years. The motility of the eyes has been defective since birth. No history of traumatism; hypermetropic. Motility outward in left eye limited to median line. Upon adduction, left eye recedes in orbit 2 *mm* and turns slightly upward at times. Lids fall inward; palpebral fissure narrows. Right eye in adduction develops horizontal nystagmoid movements. Patient complains of diplopia (homonymous) for a year and a half.

These cases may be mistaken for paralytic squints unless carefully examined. Heuck, in 1879, was one of the first to report such cases. Since that time, about seventy cases have found their way into the literature. In the majority of cases reported, in addition to the squint there is an absence of abduction (in a few cases, of adduction). Adduction was only limited, and often there was permanent exophthalmos. The retraction movements occurred upon attempting to move eyes inward. These cases may be accounted for by the insertion of the recti muscles, usually internus being very far back (in one case, 20*mm*, from cornea), or by fixation of globe on the temporal side, due to external rectus being replaced by a rigid fibrous band, with few or no muscular elements. The latter is the more common. Both conditions have been found—partly experimentally, and partly through operation. These cases are of the fibrous-band variety.

Dr. H. H. Tyson presented a case of **methyl-alcohol amblyopia.** H. S., 22 years of age, a patient at the Knapp Memorial Eye Hospital. He gave a history which was confused and contradictory, but was about as follows: Three months ago, on a Saturday afternoon, he drank some home-made cherry schnapps, made from alcohol purchased from a grocer, in which was placed some chemical. On the following Monday morning, his vision was blurred and indistinct. Two months later, he had some more of the schnapps, and about two weeks after that, another drink of it. *Examination October 27th.* Right eye: perception of movements of hand in extreme inferior part of field. Left eye: $\frac{20}{200}$, absolute central scotoma, with contraction of color field, especially above—green to 10°; blue, 25°; white, 35°, except superior arc to 10°. Fundi show extremely white disks, white lines along retinal vessels (indicating previous perivasculitis) with occasional obliteration of small branch vessels; main arteries and veins not changed much in size—altogether constituting a typical picture of methyl-alcohol amblyopia.

Dr. W. B. Weidler presented a patient with **interstitial keratitis.** P. P., age 11; the trouble began six months ago. When first seen, there was marked blepharitis, photophobia, lacrimation, pericorneal injection, and well advanced interstitial keratitis. Wassermann was positive, and well marked Hutchinson's teeth. Von Pirquet, very positive, and later a subcutaneous injection of old tuberculin gave general reaction with a rise of temperature to 104°. There is an old sinus in the left hip that has been present for years. No discharge at present time. The case has been treated with "bacillary emulsions" over a period of three months, with improvement of ocular and general condition. At present, patient is getting "bacillary emulsions" and mercurial inunctions.

Discussion: Dr. H. H. TYSON advocated the combined anti-syphilitic treatment with tuberculin injections. He related the history of one of his own cases—a little negro boy who had a very intense interstitial keratitis which did not improve much under either tuberculin injections or Hg. with K. I., when used separately, but which improved rapidly, with an ultimate good result, when both treatments were given simultaneously.

Dr. T. H. CURTAIN presented a patient where **trephining had been done for detachment of retina.** Patient, male, aged 21. Wassermann reaction, negative; von Pirquet, negative. On the morning of September 22, 1914, he noticed something wrong with the sight of the left eye, but did not seek medical attention until September 26th, when he visited the New York Eye and Ear Hospital.

When first seen, the vision was: O. D., $\frac{20}{40}$; O. S., limited to hand movements in the lower and outer fields. The ophthalmoscopic examination of the left eye showed a large detachment of the lower and outer part of the retina. The retina was bluish white, thrown into folds, with the loss of the light reflex of the vessels. This area extended well up near the macular region, but the disk was still visible. Outside of a few floating vitreous opacities, the fundus was otherwise normal. There was no history of any trauma whatever.

The patient was sent to the Manhattan Eye and Ear Hospital, which he entered the following day, October 2d. He was given the usual non-operative treatment for detached retina, consisting of the recumbent position, the instillation of ½% atropin twice daily, with a mild pressure bandage over the affected eye. Pilocarpin sweats every other day. This treatment was continued—he being kept upon his back—until October 12th, no improvement being apparent, either subjectively or objectively. He was then taken to the operating room and a scleral button—*2mm* in diameter—removed from under a conjunctival flap over the site of the detachment and as far back as possible between the inferior and external rectus muscles. The choroid and retina were not punctured at this time, and the conjunctival flap was united by two sutures of silk. A moderate pressure bandage was reapplied, the patient returned to bed, and the atropin drops still continued. He remained in the recumbent position until October 22d. The eye showed a moderate amount of reaction, and by October 22d it was fairly white. He was again taken to the operating room. A medium-sized aspirating syringe was pushed through the scleral opening made by the trephine, and clear white fluid was aspirated. Subsequently, this was found to resemble serous fluids in general.

The fundus of the eye was immediately examined. The retina was seen to have fallen back into place. The patient was returned to bed and kept there until November 4th. No detachment has taken place since that time. The vision of this eye has continuously improved, from the perception of the hand movements in the lower and outer fields to $\frac{20}{40}$ minus, with a minus 1 cylinder axis 180°. Externally, the eye shows a localized chemosis around the scleral opening. The fields of both eyes show a concentric contraction, but the fields of the left eye are equal to that of the right.

Dr. MARPLE congratulated Dr. Curtain on the result in this case, and expressed the hope that it would prove to be permanent.

Dr. E. M. ALGER presented for **diagnosis** a patient with **hysterical amblyopia, spasm, and diplopia.** She was a girl of 16 and came under observation complaining of poor vision, headaches, and seeing double. Examination showed the media clear and the fundi normal. Vision, $\frac{20}{100}$, was improved by -5 to $\frac{20}{50}$. Retinoscopy and ophthalmoscopy showed an apparent but variable myopia of several diopters. Under atropin, the myopia disappears and the refraction is a low hyperopia by all tests, and the vision $\frac{20}{30}$. Motility by Maddox rod and similar tests; she has an esophoria of less than 5°, but during ophthalmoscopy and other tests develops an extreme convergence, both eyes converging instead of one fixing and the other converging, as though she was looking at an imaginary object a few inches from the root of the nose. Outward rotation of both eyes is less than normal, but the movement does not impress one as made in good faith. Diplopia directly in front persists after the object of fixation is carried entirely beyond the range of the opposite eye, on either side—in other words, a monocular diplopia. Fields of vision are moderately contracted in each eye, but vary with each test. Field for color was not taken. Almost complete conjunctival anæsthesia; corneal sensibility, much diminished.

No very definite history obtained. Patient is bright, fond of school, does not cry, but has had two attacks of "fainting" in past six months. It seems to be a straight hysterical case. The diagnosis is important, because two ophthalmologists have advised operation on her muscles.

Dr. ALGER also presented a case of **word blindness.** The patient was a man who suffers from arteriosclerosis. Six months ago he had a seizure in the street, which did not render him unconscious but has rendered him unable to read and has apparently affected his mentality slightly. There was no evidence of any paralysis. Media clear and fundi normal in both eyes. Vision, $\frac{20}{30}$ in each, and with presbyopic correction he can see the letters in Jaeger No. 2, singly with either eye. He has a right homonymous hemianopsia, strongly defined and not including either macula. The pupils react normally. Given a card containing some familiar names, his own, for instance, or a common word, he cannot read it, though he can distinguish the individual letters perfectly. When asked to spell the word aloud, he does so readily, and immediately recognizes the word and its meaning. He gets the same effect by spelling the word to himself. This "word blindness" is due to a lesion in the angular convolutions—probably a small hemorrhage.

Dr. MARTIN COHEN reported a case of **simple detachment of the retina in both eyes during pregnancy.** Mrs. H., colored, age 26, was admitted to the Harlem Hospital Maternity Ward on September 22, 1914. She was a primipara, pregnant eight and a half months. Four days before admission, she began to complain of a gradual failure of vision. With the right eye, she can count fingers at one foot; and with the left, she recognizes finger motion at the same distance. In either eye a relative central scotoma was present. There were no other complaints of any kind. The visual fields were similar in both eyes. They were taken at the bedside with a 5*mm* white square in good illumination. The results were as follows: Temporally, 75°; above, 30°; below, 60°; binasal hemianopsia; tonometric pressure, 15*mm* mercury.

The ophthalmoscopic findings were similar in character in both eyes; disks normal; veins normal in course and caliber; arteries in general slightly contracted; no changes in the macula. A small flame-like hemorrhage was visible at the upper and outer border of the right disk, and another near the superior nasal branch of the left artery. At about two disk diameters from the lower margin of the papilla of both eyes there began a typical detachment of the retina. The retinal vessels over this area appeared dark and protruded about 2*mm*. At this early stage, the detachment presented a cauliflower-like outline.

The patient appeared to be a well nourished woman with thoracic organs normal. The ankles and feet had been œdematous for the past three weeks. Photopsia and headaches were absent, and there were no gastro-enteric symptoms. Subjectively, she complained only of the deterioration of vision. The blood pressure was 170*mm* mercury. The urine was straw-colored, cloudy, and coagulated completely on boiling. No sugar. Specific gravity, 1.018. The microscope showed a few hyaline casts. The urea excretion varied daily, from 13.9*gm* in twenty-four hours on the day of admission, to 16.7 at the time of discharge.

The treatment consisted of colonic irrigations, milk diet, veratrum viridi, and rest in bed. Labor was induced September 24th, and a living healthy child was delivered. There were no evidences of a change for the better in the eye conditions until September 29th, when the detachment was seen to be less prominent, with upper border horizontal and slightly receded. Patient could now count fingers with both eyes at five feet. The visual fields showed slight concentric contraction except above, where there was a scotoma to the horizontal meridian. There was no relative central scotoma. The hemorrhage in the right eye had been absorbed, while that in the left eye was still present. The abnormal urine findings were less marked, and the blood pressure was down to 160*mm* mercury.

The patient left the hospital against advice on October 3d, and was seen at her home one week later. The detachment was no longer apparent, and the blood-vessels which traversed the area appeared normal and on the same level with the surrounding retinal vessels. The blood clots had been absorbed. The central acuity and visual fields were normal, as were likewise the urinary findings.

The important facts in the case are: (1) The rarity of retinal detachment during pregnancy; (2) the early temporary binasal hemianopsis; (3) the spontaneous reapposition of the retina to the underlying choroid after delivery, also with no apparent tendency to recurrence.

Dr. JEAN had seen one case like this at the Lying-in Hospital.

NEW INSTRUMENTS SHOWN

By Dr. CARL KOLLER: A lacrimal canula which he has used in his office for the last four years.

By D. I. HELLER: A lid retractor to take the place of a speculum.

By Dr. A. T. HERZIG: A lacrimal probe which narrows at the proximal portion.

Paper: Dr. WILBUR B. MARPLE made some interesting remarks about his experiences and observations in Europe during wartime.

REPORT OF THE TRANSACTIONS OF THE SECTION ON OPHTHALMOLOGY OF THE ROYAL SOCIETY OF MEDICINE.

By Mr. C. DEVEREUX MARSHALL, F.R.C.S., London.

A meeting of the Section was held on Wednesday, December 2d, Mr. Priestley Smith, F.R.C.S., President, in the Chair.

Miss Rosa Ford showed a case in which an eyelash pierced the lid border backwards.

Sir Anderson Critchett showed a patient with small optical iridectomies in a case of lamellar cataract. He described the operation, which was initiated by his father fifty years ago, and narrated cases so treated in which the result was very permanent. Mr. W. H. Jessop spoke favorably of the procedure, which he had himself carried out with great success, in adults as well as in children. In one case, operated upon twenty-two years ago, the result was as good to-day as at the time. Dr. Angus MacGillivray (Dundee) said he had done the operation described several times. The results by removal of the lens were not as satisfactory in lamellar as in other forms of cataract.

Mr. Leslie Paton showed a case which he regarded as Mikulicz's disease, and gave his reasons for the view. Col. R. H. Elliot referred to a case of the disease which he published in *The Ophthalmoscope;* that of a Hindu woman æt. 49, in whom the lacrimal glands on both sides bulged like short horns, and the accessory portions of these glands projected into the conjunctival sac. The parotid, sublingual, and submaxillary glands showed fullness. Removal of the lacrimai not only improved the appearance, but was followed by subsidence of the other glands. The tissues removed presented a close resemblance to the appearance of round-celled sarcomata.

Mr. Robinson exhibited a case of **iridocyclitis,** and Mr. Eason one of **bilateral temporal hemianopia,** to illustrate the importance of taking the fields of vision in every case of optic atrophy. The patient, though he had seen many ophthalmic surgeons, became so blind that he had to be led about. His fields had not then been tested. He could make out moving objects and lights on the nasal side only. The onset of blindness within six months was unlike the history of the optic atrophy of tabes, and Mr. Eason thought he might have pituitary tumor. Within a month of taking thyroid he got remarkable improvement of vision. He still took the extract, for if he went long without it, he noticed a relapse. The sella turcica was somewhat enlarged.

Mr. Holmes Spicer showed a case with angioid streaks.

THE LATE CAPTAIN ANGUS MACNAB.

The President made sympathetic reference to the death, on the battlefield, of Mr. Angus Macnab, an active member of the Section, and proposed a resolution of sympathy with his family which was passed.

The Section then proceeded to the discussion of the subject, "The Necessity for an Exact Definition of Blindness."

Mr. Harold B. Grimsdale, in opening the debate, stated that the importance of defining, if possible, the condition of blindness had long exercised the minds of those concerned in the teaching and maintenance of the blind, and the recent awakening of public interest in the question made it all the more urgent to clear away doubt. On the recently appointed Committee on the subject, he was the sole representative of ophthalmic surgery; he had therefore invited this Section of the Royal Society of Medicine to try and arrive at something like unanimity on the question. Many members of the profession whom he had asked, found it impossible to define the status of a blind child otherwise than was done in the Act of 1893, namely, that for educational purposes a child shall be considered blind who is too blind to read the ordinary school books.

Yet all children who did not come into this definition were not fit for the ordinary school; for instance subjects of high myopia. It was desirable to have some rule for evaluation, as a guide, in each case. Many factors must be taken into account; and these concerned both the state of the patient and his employment. Both central acuity and the state of the peripheral vision must be considered, as well as the relative value of the two eyes, and the presence or absence of binocular vision. For certain employments a greater acuity was needed than for others. Those having no perception of light were but a small proportion of those ranked among the blind, while among children the proportion was still smaller. Among adults the blindness from optic nerve atrophy and glaucoma led to a preponderance over children. In a blind school, of 68 children, 8 had no perception of light. In Boston, Mass., of 2021 eye patients, .6% were totally blind, 7.7% "practically blind," with a vision less than $\frac{6}{60}$ of normal. These figures were not a guide, because totally blind persons would not seek relief. The blind persons in the United Kingdom number about 27,000 according to the Census, but this could not be accurate. The ratio of the totally blind to the economically blind was about 1 to 9. The causes of economic blindness in children differed considerably from those in the adult. In the former, the chief trouble was loss of central acuity from corneal conditions; while in adults disease of the optic nerve with contraction of the visual field operated chiefly. There was evident a tendency to make the standard of vision too high, and thus throw a large number of children into the "blind" class. One reason was that a child with bad sight demanded more individual attention from his teachers than the others, and so constituted a drag on the class as a whole. This was a stimulus to put such child into a special school. This might ensure his education being better looked after for the time, but once labeled "blind" he was liable to be drafted into a blind workshop. The coeducation of the blind and the seeing was one of the most interesting experiments which had been conducted: the blind child was first started in a special school until he had mastered the elements of Braille writing, and reading; then he took his place among sighted children in the universal school, and often competed successfully with normal children.

The capacity to read separate letters was a very different matter from being able to read words; from experiments he found that the "near" acuity as measured by reading words was often more than twice the distant acuity measured on single letters. Often so-called blind children tried to read Braille by sight in preference to by touch. He contended that between the "blind" school and the normal school there should be a third school for children who had such visual defect that they could not be taught by the aid of the blackboard. His suggestion was that a distant acuity of $\frac{6}{60}$ should be taken as the highest limit of vision for a blind school child. Those whose vision was better was $\frac{6}{24}$, unless otherwise recommended by a medical man, he would send to an ordinary school. All special schools should be inspected at least once a year, and the vision of each child tested and recorded. Among the blind there would always be two classes: those who could not see at all or scarcely so, and those who could distinguish large objects, and so could guide themselves by their eyes in unfamiliar surroundings. Given a good field, an acuity of well below $\frac{3}{60}$ enabled a man to move freely in the outside world; hence he regarded $\frac{6}{60}$ as too high a standard below which a man should be regarded as practically blind. Mr. Grimsdale then dealt with the question in relation to various trades, and in conclusion suggested the appointment of a sub-committee to deal with the question in all its bearings. It was undesirable that a Bill on the subject should pass through Parliament without any reference to the opinion of that Section of the Royal Society of Medicine, for in that case most difficult questions would be left to the decision of absolutely unqualified amateurs.

Mr. Rochcliffe said that for many years he had advocated some definition of blindness. The Local Government Board defined blindness as "Too blind, in the opinion of the Local Government Board, to perform work for which eyesight is ordinarily required." Others expressed it as "Blind for the practical purposes of life." During thirty years he had examined and admitted into a blind school large numbers, and his decisions had not been questioned. He divided cases into (a) blind; (b) partially blind. The latter were those who were able to differentiate fingers at a greater distance than three feet. There should be a clear distinction drawn between capacity for ordinary school education, and for technical education. A good broad distinction was: those who could count fingers at three feet, and those who could not. There should be a clear decision as to who should be participants in pensions for the blind.

Dr. ANGUS MACGILLIVRAY (Dundee) said that for industrial purposes so-called blind people could be divided into three classes: (1) totally blind, those who had no perception of light; (2) practically blind, those possessing perception of light but unable to take part in industrial occupations owing to marked impairment of vision; (3) the partially blind, whose defect prevented them obtaining employment in ordinary sighted workshops, their vision yet being such as to disqualify them from entrance to a blind institution. Thirty per cent. of the inmates of blind institutions belonged to the category of partially blind. He discussed the case of children, and the general question in relation to occupations.

Mr. N. BISHOP HARMAN contended that there was only one exact definition of blindness, the dictionary one—"want of sight." But the term was used to include many varieties of partial blindness, and for those that definition was sought. Vision was a complex act: acuity, field, mobility, mentality, and effects of difference of lighting, habit and custom, all took a share in the sensation. It was not possible by any sufficiently simple definition to gather up possible varieties, any one of which might constitute partial blindness of serious order. Any definition must be related to the facts of life, must have reference to the person's capacity for work. If it could be certified that he was incapacitated from engaging in profitable labor by reason of his defect, his was a state of blindness. Any attempt to pass a definition of blindness drawn in professional terms, to operate through the Legislature, was, he contended, doomed to failure, and was liable to be altered out of recognition. The definition in the Elementary Education Act, "inability to read the ordinary school books used by children," was worthy the judgment of Solomon, for it defined blindness in terms of life. He pointed out the parallelism of the case of mental defectives, in which also reference was to life. He advocated a certification of blindness by two independent and duly approved medical men, who should be required to state their opinion, and the facts upon which that opinion was based; such opinion being subject to the scrutiny of the medical officer of the proper authority.

Mr. RICHARDSON CROSS (Bristol), thought the Legislature was rightly attacking this question. If a child's sight was such that it could not attend the ordinary school, some other arrangement for its education must be made. There were blind schools for those nearly blind, and intermediary schools for myopes. Anything brought forward to deal with the infirmity in adults would not influence the good work being done for the children. Ophthalmic surgeons should agree among themselves as to a proper definition of a blind person. He thought it would be unsound to take the view that the layman was unable to judge on this matter. He thought the Registrar would accept two classes. One would embrace those who had no more than perception of light; the other either Snellen's types, or finger-counting, the latter for preference. Anyone who could not count fingers at a greater distance than a yard should be regarded as practically blind. In order to be practical, he thought that at first there should be some sacrifice of scientific precision; this could perhaps be arrived at later.

Mr. W. T. HOLMES SPICER contended that the persons to decide this question should be expert ophthalmologists, not lay members of a County Council. Any rules arrived at should be for the guidance of expert examiners.

The President pointed out how well qualified this Section was for giving expert advice on such a matter, which was of the first importance.

QUARTERLY REVIEW OF THE PROGRESS OF OPHTHALMOLOGY.

By H. KOELLNER, Berlin; W. KRAUSS, Marburg; R. KÜMMELL, Erlangen; W. LOEHLEIN, Greifswald; H. MEYER, Brandenburg; W. NICOLAI, Berlin; H. PAGENSTECHER, Strassburg; K. WESSELY, Würzburg; and M. WOLFRUM, Leipsic, with the Assistance of Drs. ALLING, New Haven; CALDERARO, Rome; CAUSÉ, Mainz; DANIS, Brussels; GILBERT, Munich; GRÖNHOLM, Helsingfors; v. POPPEN, Petrograd; TREUTLER, Dresden; and VISSER, Amsterdam.

Edited by MATTHIAS LANCKTON FOSTER, M.D., New Rochelle, N. Y.

SECOND QUARTER, 1914 (*Continued*).

VII.—THE SENSE OF SIGHT.

60. DELL' ERBA. **Contribution to the physiology of the visual function.** *Annali di Ottalm.*, v.–vi., 1913.

61. FISHER, J. HERBERT. **Observation on the learning of vision, after a successful operation at the age of six years, in a congenitally blind patient.** *Ophthalmic Review*, June, 1914, p. 161.

62. GILDENMEISTER. **Some analogies between optical effects and electrical stimuli.** *Zeitsch. f. Sinnesphysiol.*, xlviii., p. 252.

DELL' ERBA (60, **Contribution to the physiology of the visual function**) was obliged to have his left eye enucleated in consequence of an accident. The vision of his right eye remained perfect for two years, then came a loss of appreciation of details and of distance. This condition improved gradually until it was almost normal again at the end of a year. He thinks that perhaps there is a special stereoscopic center which serves to blend the retinal images into one, and through this blending produces the appreciation of detail, distance, and localization in space. This theory explains how a person who closes one eye enjoys the benefits of binocular vision, as the center continues to functionate under the influence of only one retina through association with former perceptions. After the enucleation of one eye this center atrophies in consequence of lack of function and extension of the process of degeneration. In the case of the writer this happened at the end of two years. It is possible that a one-eyed person, in whom this center has become atrophic, regains perception of bodies and space through a new education and habit. Dell' Erba is inclined to locate the supposed stereoscopic center in the internal geniculate ganglion.

CALDERARO.

GILDENMEISTER (62, **Some analogies between optical effects and electrical stimuli**) says that the very weakest light stimuli appear to die out shortly after the flash, not differing in this respect in their action from the electrical current, which also is ineffective after the closure. Both are transient stimuli. On the other hand strong electrical currents stimulate during their whole continuance, and the same is true of ordinary light stimuli.

FISHER (61, **Observation on the learning of vision**) reports a case in which he describes the attempts to make use of the newly acquired vision by a child of six years, after a successful operation. The case is very similar to the one reported by Uhthoff, but without the difficulties in orientation and the tubular field, which were present at first in Uhthoff's case.

CURRAN.

VIII.—ACCOMMODATION AND REFRACTION.

63. BOURDEAUX. **Treatment of extreme myopia.** *Ann. d'oculistique*, cli., p. 470.

64. MARQUEZ, M. **Biastigmatism and its treatment with double cylindrics at oblique axes.** *La clinique ophtalm.*, xx., p. 221.

65. MEYERHOF, M. **Study of myopia as a hereditary, racial disease among the Egyptians.** *Annales d'oculistique*, cli., p. 257.

MARQUEZ (64, **Biastigmatism and its treatment**) believes that there are more cases of extracorneal astigmatism than is generally admitted. This refractive error, wrongly called lenticular astigmatism, may or may not have the same direction as that of the corneal astigmatism. It is just such cases in which the principal meridians of the corneal astigmatism do not coincide with those of the lenticular or rather of the extracorneal astigmatism, that the author wishes to call "biastigmatic." The diagnosis is made first by correcting the corneal astigmatism according to the findings with the ophthalmometer, then by the subjective method—namely, adding the cylinder on an axis which succeeds in making the lines on the astigmatic dial of equal brightness. The correction of biastigmatism consists in combining cylinders with their axes inclined or cylindrical torics or bitorics. The author gives a table of formulas by the aid of which a combination of two cylindrics, axis inclined, may be transformed in spherocylindrics.

SCHOENBERG.

MEYERHOF (65, **Study of myopia in Egypt**) found 18% among 7617 patients to be myopes. The male is more frequently affected than the female sex. The radius of corneal curvature was 7.41*mm* in patients of less than 10 D. and 7.30*mm* in those of more than 10 D. myopia. The interpupillary distance, contrary to the assertion of some authors, was found to be smaller in myopes than in hypermetropes and emmetropes. Astigmatism, measured with the ophthalmometer, was found present in 40% of all the myopes. The author attributes the high percentage of myopia among Egyptians to an inborn weakness of the sclera, peculiar to the race. It is surprising to learn that myopia is very rare among Nubians and Soudanese, living in such a close neighborhood.

SCHOENBERG.

BOURDEAUX (63, **Treatment of extreme myopia**) recommends total or subtotal correction under atropine, prolonged atropinization of the eyes, the use of a pressure bandage at night, and frequently during the day, and subconjunctival injections of 20% salt solution with cocaine and dionin. General treatment is not neglected. He reports some excellent results.

CAUSÉ.

IX.—THE MOTOR APPARATUS OF THE EYE.

66. AGRICOLA. **Indications for, and action of, advancement.** *Ninth Meeting of the Ophthalmological Society of Lower Saxony.*

67. BIKELES. **Explanation of a phenomenon of the orbicularis oculi.** *Zentralblatt f. Physiologie*, xxvii., p. 1267.

68. BIKELES and ZBYSZEWSKI. **An action of the orbicularis oculi after irritation of the cerebrum.** *Ibid.*, p. 1265.

69. LEVA. **Caloric nystagmus in comatose conditions.** *Thirty-ninth Meeting of the Neurologists and Alienists of Southwest Germany*, May 23d.

70. OVIO. **Movements of the eye and retinal images in reading.** *Arch. di Ottalm.*, 1914, p. 29.

71. ROSENFELD. **Vestibular nystagmus of the head and of the facialis in pseudobulbar paralysis.** *Arch. f. Psychol. u. Nervenkrankheiten*, liii., p. 1130.

72. SCHMIDT. **Monolateral nystagmus.** *Diss.*, Rostock.

The movements of the eye and the production of images form, according to OVIO (70, **Movements of the eye and retinal images in reading**), two important factors of the mechanism of the eye in reading. These movements are lateral convergence and accommodation movements, which cause displacements of 25° to 30°. They are therefore enormous and capable of producing weariness, as is evident when one thinks that the visual field has an extent of 80° in each meridian, and that movements that exceed a third of the potentiality of an organ always cause weariness. The author does not believe that the slight movements of accommodation which take place during reading are a cause of myopia, because they represent a physiological function, and the varying tension is less harmful than the constant. As the object and the picture correspond to sections of a parallel, they have similar forms, but as soon as the object is sought, the sections of the cone are no longer parallel and the image presents a different form. Tilting of the object reduces the picture in proportion to its nearness to the eye, so that when one reads under such conditions he uses not a quarter nor a third of his visual acuity, but a half or more. In this way we exceed the limits within which a work can be performed without weariness.

CALDERARO.

Patients with facial paresis are often unable to close the eye on the affected side although the closure of both eyes is complete and prompt. Hitherto it has been thought that this phenomenon was because of a double localization of the closure of the eye in the central organ. BIKELES (67, **Explanation of a phenomenon of the orbicularis oculi**) presents the explanation that the bilateral closure of the eyes requires less energy of innervation than the closure of either one, and that therefore when there is a mild degree of paresis of the orbicularis the innervation may not suffice to close the one eye, although sufficient to close both.

BIKELES and ZBYSZEWSKI (68, **Action of the orbicularis after cerebral irritation**) make some statements concerning the action of the orbicularis after irritation of the cerebrum. Irritation of the cortex usually produces twitching of the orbicularis on the contralateral side, in some cases on the same side. A notable point is that after the cessation of the irritation twitchings appeared in both orbiculares. The authors maintain correctly that this cannot be due to a double innervation, but that only the ordinary common action of the two centers is the cause of the twitchings of the unirritated orbicularis in these cases.

LEVA (69, **Caloric nystagmus in comatose conditions**) describes the caloric investigation of the vestibule which he finds particularly fitted for the examination of unconscious patients. He pictures the different kinds of caloric reaction in coma, and distinguishes four stages of coma according to the type of reaction. Type 1: The reaction of normal consciousness; the eyeballs make strong nystagmic movements toward the opposite side. Type 2: The reaction of brightening consciousness; moderate nystagmus toward the opposite side, with fluctuating movements of deviation toward the irrigated ear. Type 3: The reaction of deep coma; the eyeballs turn toward the side of the irrigation and remain quiet for a long time, fixed deviation toward the same side. Type 4: The reaction of terminal coma; the eyeballs remain immovable in their original position, there is no reaction at all. The author has calorized a number of patients in coma and noted particularly whether it was possible to determine from the reaction which of the two hemispheres was the more affected. I. In two patients he found the reaction to be of type 1; there was no difference between the right and the left as regards the caloric reaction, whence he concludes both hemispheres to be equally affected. II. Three other cases presented general symptoms of tumor of the brain; two showed no localizing symptoms, the third had signs of a spastic hemiparesis. In all three the calorization of the side proved later by autopsy to be affected produced type 2, while on the other side it gave type 1. III. In a sixth case which came under observation in deep coma and furnished no localizing symptoms either in his history or in his clinical condition, a cerebral tumor was suspected, and autopsy revealed a tumor of the hypophysis, calorization of the side in which the tumor had proliferated most gave no reaction, type 4, while on the other the reaction was that of type 2. Observations II. and III. therefore go to show that the caloric reaction more nearly approaches the type of terminal coma on the side corresponding to the more diseased hemisphere than on the other. IV. An atypical reaction appeared in a seventh case. Calorization on each side excited none of the four mentioned types, but an irregular oscillation in which a quick and a slow phase, that of nystagmus, could not be perceived. Autopsy revealed multiple tumors in both hemispheres. Leva concludes from these observations that caloric nystagmus shows a distinct difference between the right and the left in cases in which lesions that contract the space within one half of the skull have been proven *post mortem.* The vestibular apparatus has its excitability much more greatly disturbed on that side than on the other. When lesions are present on both sides there is no difference in this excitability. A conclusion can be drawn from this variance in the vestibular reaction with regard to the side on which there is a space-contracting lesion, and this helps to the location of the lesion. This may be of special diagnostic importance when the lesion is situated in such regions that localizing symptoms are not produced.

SCHMIDT (72, **Monolateral nystagmus**) adds a new case to those of this condition heretofore reported. He divides the cases into four groups: (1) those in which there is or has been a disease of the central nervous system; (2) those associated with strabismus; (3) those in which the nystagmic eye is amblyopic without strabismus; (4) those in which it is associated with movements of the head. Finally there remain six cases not included in these four groups, such as experimental nystagmus and after traumatism.

ROSENFELD (71, **Vestibular nystagmus of the head and facialis in pseudobulbar paralysis**) found an unusual symptom by vestibular stimulation in a man 66 years old with pseudobulbar paralysis. Pareses and contractures with increased reflexes, bulbar disturbance of speech, loss of voice, and dementia had occurred in the course of the disease. Irrigation of the ear with cold water excited, after a short period of latency, marked nystagmus toward the opposite side and at the same time very lively twitchings of the head in the same direction, with an amplitude of at least 45°. This nystagmus of the head lasted some half a minute longer than the irrigation, that of the eye longer still. Irrigation of the left ear excited rhythmic twitchings in the right facialis. This facial symptom was absent in rotation nystagmus, and only a lively nystagmus of the eyes was caused by galvanism. He believes that the supranuclear foci had effected a separation of the bulbar centers from the cerebrum, so that the excitability of the former was increased and able to express itself by a reaction in groups of muscles that otherwise are not affected by stimulation of the vestibularis.

AGRICOLA (66, **Indications for, and action of, advancement**) says that one should never try to correct more than 15° of strabismus convergens by this operation alone. He recommends a graduated tenotomy associated with the advancement. When possible he tries to obtain the effect desired by a single or a double advancement. When one eye is highly amblyopic and there is a considerable squint one must add either a graduated or a complete tenotomy. He likewise employs a single or a double advancement in divergent strabismus; the former will usually suffice when there is a high degree of amblyopia. In alternating strabismus, even of slight degree, a double advancement is usually necessary, sometimes together with a tenotomy. Likewise in periodic divergent strabismus a double advancement is often necessary.

X.—LIDS.

73. GIBSON, CHARLES L. **Blepharoplasty by a pre-grafted flap.** *Annals of Surgery*, June, 1914.

74. KRUSIUS, FR. **The implantation of living hairs to form eyelashes.** *Deutsche med. Wochenschrift*, p. 958.

75. LOEWENSTEIN, A. **On chalazion and the inflammatory lid tumor.** *Archiv f. Ophthalmologie*, lxxxvii., 3, p. 391.

76. MAHER, W. ODILLO. **An operation for trichiasis.** *Ophthalmoscope*, April, 1914.

77. MAWAS, F. **Researches concerning the histology and histochemistry of xanthelasma.** *Annales d'oculistique*, cli., p. 437.

78. NOGIER. **Treatment of an epithelioma of the nose with radium.** *La clinique ophtalm.*, xx., p. 291.

79. VAN DUYSE, G. M., JR. **Pavement epithelium, adenomatoid carcinoma of the Meibomian gland.** *Arch. d'ophtalm.*, xxxiv., p. 355.

80. WILDER, W. W. **Sporotrichosis of the eye.** *Jour. A. M. A.*, April 11.

LOEWENSTEIN (75, **Chalazion and inflammatory lid tumor**) reports the anatomical findings in twenty-eight cases of chalazion and attempts to explain the chalazion as an anaphylactic inflammation. He distinguishes two groups of chalazia. The first, corresponding to the regular, well defined nodule with soft contents, consists of enormous masses of plasmatocytes which are arranged in numerous infiltrates, frequently showing a regular concentric arrangement. In the other form, dense, newly formed fibrous tissue prevails. Clinically this form is characterized by the multiplicity of the chalazia and their tendency to relapse. Caverns are found frequently in the center of the nodules; their origin is doubtful. He has never found tubercle bacilli, although giant cells were frequent. In the experimental part, Loewenstein describes the anatomical changes that he has produced in the lids of rabbits by single, and by repeated injections of different substances. None of them reminded him of a chalazion, and the anaphylactic origin of the latter remains the same as heretofore, mere hypothesis without any solid basis.

SCHIRMER.

MAWAS (77, **Histology and histochemistry of xanthelasma**) has carefully examined pieces of skin excised from areas of lid with xanthelasma from twenty patients and concludes that the xanthelasmic cells have a glandular function and secret lipoids to which is due the yellow color of the tissues. Three plates illustrate the paper.

SCHOENBERG.

VAN DUYSE (79, **Carcinoma of the Meibomian gland**) describes in detail the histological findings in an atypical, mixed, epithelial tumor of the Meibomian gland found in a patient 60 years old. The prominent feature in the histological picture of the intratarsal tumor was its formation of pavement and glandular epithelium, which had developed at the cost of the former. The origin of the growth is to be considered as an indirect, embryonal metaplasia.

CAUSÉ.

NOGIER (78, **Treatment of an epithelioma of the nose with radium**) reports a case in which a fairly large epithelioma of the left side of the nose of a man 80 years old was treated successfully with radium. The scar was perfectly firm within a month and the epithelioma was cured. Nogier emphasizes the point that results may be obtained by radium treatment that cannot always be secured with the X-rays.

CAUSÉ.

WILDER'S (80, **Sporotrichosis of the eye**) case was that of a student who infected his eye with sporothrix and developed pain, swelling of the lids, and hypertrophy of the conjunctiva of both eyes. There were also present on the conjunctiva several elevated yellow spots. There were constitutional symptoms, leucocytosis, and enlarged preauricular glands. Sporothrix was grown in culture tubes and spores were found in the scrapings. It was two months before the signs disappeared. Sixteen cases of sporotrichosis of the eye have been reported.

ALLING.

In GIBSON'S (73, **Blepharoplasty by a pre-grafted flap**) first case he employed the Dieffenbach method as a basis for his procedure; in his second and third the Fricke or Celsus method. The first step in the operation consists in making an incision from the outer canthus upward and outward. The lower edge of the incision is undermined so as to form a pocket large enough to contain a flap of skin which is to form the posterior surface of the new lid. A single skin graft is then tucked into the pocket, so that the subcutaneous surfaces are in apposition, and allowed to heal. Ten days later the growth at the outer half of the lid is removed by a quadrangular incision. An incision is now made parallel to the original incision and a sliding flap, with the epithelial lining, is drawn down and sutured into position, covering the defect.

GROUT.

ODILLO MAHER (76, **An operation for trichiasis**). This operation republished from 1897 consists of dividing the "cartilage" from the under surface of the lid from end to end at about 3*mm* from the free edge, dissecting so as to allow the cut to spread, and transplanting, from the mucous membrane of the lip, a strip about 3½*mm* wide and the full length of the incision. This is fixed in place with three silk sutures, with knots 2*cm* from ends, which are brought through the skin from the under surface. These are left in for thirty-six hours and then removed. The object in having the knots from the ends is to facilitate removal of the sutures. He has used the operation in some hundreds of cases during the last fifteen years with good results.

CURRAN.

KRUSIUS (74, **Implantation of living hairs to form eyelashes**) gives a new procedure for this purpose. It is best to take the hairs from the patient himself, from the eyebrows, or elsewhere, whence they are removed together with their roots and follicles. Each is then placed in a hollow needle which is introduced 2 or 3*cm* from the margin of the lid, passed between the skin and tarsus to the margin of the lid and brought out in the row of lashes. The hair is then drawn out a proper distance by means of forceps. Not more than twenty hairs should be implanted at a single sitting. The cosmetic effect is said to be good and the operation to be slight.

XI.—LACRIMAL ORGANS.

81. BRIDE, L. MILNES. **A case of dacryops.** *Ophthalmic Review*, April, p. 99.

82. CASALINO. **Surgical treatment of catarrhal, chronic, or recurrent dacryocystitis of a phlegmonous character.** *Arch. di Ottalm.*, Sept., 1913.

83. HASLINGER, E. **Complex connective-tissue tumor of the lacrimal gland.** *Archiv f. Ophthalmologie*, lxxxviii., p. 28.

84. MAYER, O. **Nasal opening of the tear sac.** *Zeitschrift f. Augenheil.*, xxxi., p. 544.

BRIDE (81, **Dacryops**) reports a case of dacryops in a child one year and five months old. The cyst was between the left upper lid and the globe and was about as large as a pigeon's egg. It was filled with fluid containing a flocculent precipitate.

CURRAN.

Gallenga performs almost exclusively in the clinic at Parma extirpation of the sac in chronic dacryocystitis and cauterization of the sac in phlegmonous dacryocystitis. Since 1907, says

CASALINO (82, **Surgical treatment of dacryocystitis**) there have been 175 extirpations of the sac with perfect healing; only three recurrences have occurred. If one wishes to remove the internal part of the nasal canal after extirpation of the sac, he may use the bayonet knife of Cirincione, or curette it away with a sharp spoon. The margins of the wound are not sutured.

CALDERARO.

MAYER (84, **Nasal opening of the tear sac**) has employed this method in twelve cases, with eleven good results. In one a new occlusion was formed by the growth of a synechia with the greatly deviated septum. Such deviations should be corrected by a submucous resection previous to the operation. The operation proves good also in ectasia of the sac and abscess in its region. West's operation has the advantage over Toti's in the avoidance of a cutaneous scar; it is doubtless more difficult, but is also surer.

HASLINGER (83, **Tumor of the lacrimal gland**) describes a tumor that has no relation histologically to the lacrimal gland, although situated in it. It was composed of an indurated connective-tissue capsule and supporting framework containing myxomatous tissue full of cartilaginous islands. The entire tissue was permeated by complexes of epithelial-like cells that varied extremely in appearance, but were lacking in intercellular bridges.

(*To be continued*)

EDITORIAL NOTICE.

The Archives of Ophthalmology is a bi-monthly journal, published in annual volumes of about six hundred pages each, extensively illustrated with cuts in the text, half-tone text plates, and lithographic plates, many in colors.

About three quarters of the space is devoted to original papers, and the remaining quarter to a systematic report on the progress of ophthalmology, and to reports of societies, book reviews, and miscellaneous notes, all of it original.

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VOL. XLIV. NO. 3

ARCHIVES OF OPHTHALMOLOGY.

DISCRETE LYMPHOID INFILTRATION OF THE ORBIT.

BY DR. GEORGE COATS, LONDON, ENG.

(*With three figures on Text-Plate No. V.*)

THE following case is reported as an example of a condition of which only two other instances seem to have been recorded. It raises also some interesting speculations relative to the obscure groups of the lymphomatoses.

SUMMARY.

Proptosis of the right eye forwards and slightly upwards and outwards, of ten months' duration in a man aged 37. Movements practically full. Firm resistance to backward pressure. Some enlargement of the retinal veins and blurring of the outline of the disk. Vision with correction R. = $\frac{6}{6}$ *pt.; L.* = $\frac{6}{5}$. *Exenteration of orbit. Seven years later commencing similar affection on the left side. Patient's health perfect throughout. Physical examination revealed no abnormality. Blood examination negative.*

Pathologically. Orbital tissues strewn throughout with numerous isolated nodules of lymphoid tissues situated chiefly in the fibrous trabeculæ and along the larger vessels. These nodules are composed not only of lymphocytes, but also of fully developed lymph follicles. No special concentration of the changes in the vicinity of the fornix or lacrimal gland. No microörganisms demonstrable.

The patient, Nathan V., a Jew, aged 37, first came under medical observation at the London Hospital on April 4, 1907. Mr. A. Roxburgh kindly informs me that at this time he was suffering from proptosis of the right eye. A small growth, believed to be an adenoma of the lacrimal gland, was removed, but without improvement in the local condition. He was readmitted in October, 1907, when an exploratory operation was undertaken, and showed the presence of a growth filling the back of the orbit. Exenteration was advised but was refused.

On November 13, 1907, he was admitted to the Royal London Ophthalmic Hospital under Mr. Gunn where the following notes were made by Mr. A. C. Hudson. He stated that the prominence of the eye had commenced seventeen months previously, and had gradually increased. There had been no pain or diplopia, and he had never suffered from toothache, or from nasal discharge or hemorrhage. Vision had not been affected.

On the right side there was great soft œdema of the lids with much venous congestion of the conjunctiva, especially below. An elastic tumor was felt in the upper-inner angle of the orbit. It appeared to be attached to the bone and was not movable. There was no pulsation or bruit. The globe was displaced considerably forward and slightly upwards and outwards. Movements appeared to be full, but with the Maddox rod diplopia was elicited indicating an upward and outward displacement compensated by 2.5° and 1.5° prisms. There was firm resistance to backward pressure. In both fundi the disks had rather blurred outlines and the veins were enlarged. Vision with correction of slight myopic astigmatism, R. = $\frac{6}{6}$ pt.; L. = $\frac{6}{5}$. Fields full.

There was no evidence of visceral disease. The spleen was not hypertrophied and the resonance over the sternum was unimpaired. No lymphatic enlargement. The right antrum was less translucent than the left, but there was no displacement of the bony walls or obstruction of the right nasal passages; the right first molar was carious. A subsequent X-ray examination showed no bony abnormality.

On November 16, 1907, the right orbit was exenterated. The growth appeared to be continuous with tumor tissue in the ethmoidal region and antrum, and the bony walls of the orbit were thought to be eroded on the inner side and below. A single Thiersch graft was subsequently applied to the denuded surface (see Hudson, *Trans. Ophth. Soc.*, vol. xxviii., p. 213, 1908) and healing was uneventful.

An examination of the blood on December 10, 1907, gave the following result:

Red corpuscles	4,642,000
Leucocytes	12,620
Hæmoglobin	90%

Differential leucocyte count:

Polymorphs	64.5%
Mononuclears (large and small)	33.0%
Eosinophiles	2.5%
Mast cells	?

Blood platelets somewhat abundant.

The patient has been under intermittent observation since. In March, 1910, Dr. Duncan Davidson reported that he was quite well and had maintained his weight. There was no glandular enlargement or local recurrence and the vision and movements of the other eye were perfect.

On February 6, 1914, he was admitted to hospital under Mr. Hudson with conjunctivitis of the left eye. On the 26th it was noted that the lids were slightly œdematous and it was thought that upward movement was a little deficient.

The fundus was noted to be rather pale, the veins dark and distended; on June 11th, however, it was passed as normal. On March 17th, Dr. James Taylor reported that he could find no abnormality of the heart or blood-vessels. On July 13th proptosis of the left eye was marked. Upward movement was very poor, inward and outward limited; there was no ptosis. Vision $\frac{6}{6}$. No fundus change except slight fullness of the veins. On Sept. 26, 1914, there was some swelling of the lids, enlargement of the conjunctival vessels, and slight chemosis near the outer canthus. There was no hypertrophy of the lymphoid tissue of the conjunctiva, or formation of follicles in the fornices. The orbital tissues generally, especially on the inner and outer sides, gave an elastic resistance to backward pressure. The preauricular gland on the left side was just palpable. Subsequently (Oct. 6th) some pea-like bodies (? lymphoid nodules or lobules of orbital fat) could be felt in the upper-outer part of the orbit. The Wassermann reaction, tested on July 20th, was negative.

Differential leucocyte counts were undertaken by Mr. S. H. Browning on two occasions, with the following results:

March 2, 1914.

Polymorphs	62.6%
Lymphocytes	28.6%
Large mononuclears	4.3%
Eosinophiles	4.3%

June 6, 1914.

Polymorphs	67.3%
Lymphocytes	25. %
Large mononuclears	4.6%
Eosinophiles	2. %
Mast cells	1. %

On March 19, 1914, secondary anæmia is noted. Red corpuscles 3,600,000.

Pathological Examination.—On examining the exenterated orbital contents it appeared at first as though no abnormality were present. Closer scrutiny however revealed a number of small yellow points, which proved on microscopical examination to consist of small discrete lymphoid nodules, scattered everywhere throughout the orbital tissues (Fig. 1). In general they are situated within, or in the vicinity of the fibrous trabeculæ rather than among the fat lobules, the appearance of free nodules in the latter situation being probably due to peripheral section. This distribution corresponds with an intimate association between the nodules and the orbital vessels. In the vicinity of all the larger nodules and aggregations of nodules an artery of some size is found, and few of the larger arteries are without such an accompaniment. In general the artery does not run through the actual lymphoid masses, but rather forms a center round which the individual follicles are grouped, like buds, some on one side, some on another, but seldom forming a complete sheath in any one part of the course of the vessel (Fig. 2). The veins are also accompanied by lymphoid infiltration but less constantly and rather in the form of sheaths of lymphocytes than of fully developed true follicles. The smaller arteries and veins, especially those within the fat lobules, are not infrequently free from infiltration.

Tracts of lymphocytes follow the vessels among the fibers of the orbital muscles; in places also, especially in the neighborhood of the larger vessels, there are well developed nodules of true follicular tissue within the muscles. As a rule, the muscle itself has undergone little or no structural alteration; in places, however, the infiltration is more intimate and there is possibly some breaking down of the fibers (Fig. 3). The vessels themselves are healthy.

The lymphoid tissue of the tarsal conjunctiva presents no abnormality; it is small in amount and contains no follicles. Above the level of the tarsus and in the fornix, lymphocytes become more abundant, and one or two small follicles, deeply buried in the tissues and surrounded by more diffuse infiltration, are demonstrable. Some of the smaller vessels of the bulbar conjunctiva are clothed with small collections of lymphocytes. The typical discrete infiltration of the orbital tissues only commences some distance farther back, and although one or two small intermediate patches may be found there is no intimate connection between that infiltration and the lymphoid tissue of the fornix, nor do any continuous strands or tracts lead from one to the other. The conditions are the same in the upper and lower fornices.

A somewhat more intimate association subsists between the abnormal infiltration and the lacrimal gland. Nodules are found in contact with, and among the lobules of the gland, and in places even, there is a more diffuse infiltration, with some disorganization and atrophy of the acini. Plasma and other inflammatory cells are present in moderate numbers in the conjunctival fornices and among the glandular acini.

Histologically the nodules are composed of the following elements: (1) Lymphocytes, disposed for the most part in the periphery. (2) Larger mononuclear cells, with more abundant protoplasm and a paler nucleus, often showing well developed chromatin dots. These cells form the bulk of the central portion of the nodules. (3) Some still larger elements often lying in the center of a space. The nucleus is frequently overgrown and not uncommonly multiple. The cell body is large, and intraprotoplasmic granules are common. (4) A few plasma cells are present near the nodules but they do not form a marked feature of the infiltration.

From this description it will be seen that all the elements of a true follicle are present. Moreover their arrangement is perfectly typical—the lymphocytes in the periphery, while the larger mononuclear cells form a paler "germ center." The largest cells with granules in their protoplasm correspond with Leber's "Körperchenzellen" which are characteristic elements not only of trachoma follicles, but also of lymphatic glands, and of lymphoid tissue generally. The nodules are traversed by a system of fine vessels which is better developed than is usually the case in trachoma follicles or in the follicles of lymphatic glands. Except for slight penetration of the peripheral lymphocytes among the neighboring fat cells the nodules are usually sharply circumscribed; and in considerable areas the orbital adipose tissue has a perfectly normal appearance.

No bacteria could be found in sections stained by Gram's method.

The only other cases known to me which present any real resemblance to the present are the following two recorded by

Birch-Hirschfeld (*Graefe-Saemisch Handbuch*, II. Teil, IX. Bd., XIII. Kap., p. 497, 1909; *Ber. d. Ophth. Gesellsch. Heidelberg*, xxxii., p. 127, 1905):

1. A man aged 37 had noticed prominence of the left eye for three weeks. He was, and had always been, healthy. No pain. Blood examination negative. No swelling of lymphatic glands. Left globe displaced 9*mm* straight forwards. Movements limited equally in all directions. No local tumor palpable. Vision almost normal, disk slightly hyperæmic but with sharp edges. Since the exophthalmos increased considerably under the use of pot. iod. and arsenic, a Krönlein operation was performed. No local tumor was found but all the retrobulbar tissues were of a firm consistence suggesting a diffusely infiltrating sarcoma. The orbit was exenterated.

Two and a half months later he returned with considerable exophthalmos of the right eye, which had developed painlessly during the preceding fortnight. Here also the displacement was straight forward, the vision and fundi normal, the ocular movements limited equally in all directions. In spite of energetic treatment with pot. iod., iodipin, and arsenic the exophthalmos increased from 4.5*mm* to 12*mm* and the eye was lost from a perforating ulcer. Subsequently the exophthalmos slowly subsided. Four years later there was no enlargement of lymphatic glands nor any deterioration in his general health.

Microscopical examination showed the orbital tissues to be sown throughout with numerous areas of lymphoid tissue. Sheaths of lymphocytes clothed the vessels, and infiltrated the muscles and adipose tissue. In many places there was a development of typical follicles exactly resembling trachoma follicles. Endothelial proliferation and hyalin degeneration were present in many of the vessels. There were no hemorrhages, necrotic areas, giant cells, or collections of polymorphonuclear leucocytes, but typical plasma cells were present in considerable numbers in the periphery of the patches. Bacteria were absent.

2. A woman, aged 23, had always been healthy except for purpura two years before. There was no evidence of syphilis, tubercle, leucæmia, pseudoleucæmia, or any other constitutional or local disease. In the inner-upper angle of the left orbit a firmly resistant mass was palpable, which stretched back into the depths of the orbit. It was closely connected with the bone, left the skin intact, and caused slight ptosis and an exophthalmos of 3*mm*. Movement was

limited in an upward direction only, the fundus was normal, and vision unimpaired.

After unsuccessful treatment with pot. iod. a piece of the tumor was excised, when it was found that the growth extended from the inner almost to the outer canthus, and was easily separated by blunt dissection from the periosteum of the orbital roof; in other directions its limits were ill-defined.

Its microscopical characters closely resembled those of the first case—the same lymphoid areas, partly disposed in follicles, partly infiltrating more diffusely; the same vessel changes and infiltration with plasma cells. The subsequent course of the case however was more favorable. Potassium iodide was inefficacious, but the growth and the exophthalmos disappeared under the use of arsenic. During treatment with potassium iodide a small tumor developed on the inner side of the right orbit, but subsequently disappeared. After a period of observation of one year there was no recurrence.

The close resemblance of the present case to these two, and the highly peculiar characters of all three, undoubtedly justify their classification apart. The absence of vascular disease was the only point of any importance in which my case differed from those of Birch-Hirschfeld. The relationship of this group with other forms of lymphoid infiltration of the orbit presents a problem of considerable difficulty.

CLASSIFICATION OF THE LYMPHOMATOSES.

Briefly, the classification of the lymphomata which appears to find most favor with general pathologists may be summarized as follows:

1. The term "simple lymphoma," or "simple lymphadenoma," would be applied to a purely local tumor reproducing accurately the histological characters of lymphoid tissue, and not associated with evidence of any constitutional dyscrasia. It is pointed out by Adami that since lymphoid tissue occurs in nearly every situation in the body it must always be difficult to distinguish such a tumor from a purely local hyperplasia of pre-existing lymphoid tissue. Accordingly some authors do not admit the existence of such a neoplasm; one case, however, is recognized by Adami. For a review of the question from the ophthalmological standpoint, and for a summary of certain

cases which have been reported under this title, the reader is referred to a subsequent paper (p. 235).

2. Tumors of simple lymphomatous type associated with general enlargement of the lymphatic glands and with lymphoid growths in other organs, but without blood changes, are characteristic of the condition known as pseudoleucæmia, or Hodgkin's disease.

3. In lymphatic leucæmia localized tumors of simple lymphomatous type may occur in the orbit as well as in the lymphatic glands and elsewhere. According to Adami the histology of the lymphatic glands differs in pseudoleucæmia and leucæmia; in the former there is overgrowth of the reticular and connective-tissue elements, such as is found in tubercle, with a preponderance of larger cells of endothelial type, and a marked abundance of eosinophiles; in leucæmia the imitation of normal glandular structure is much more exact. These conditions would seem to indicate some unknown inflammatory or irritative element in the etiology of pesudoleucæmia. In neither affection do the tumors show any locally aggressive tendency. The orbital growths of leucæmia (as well as the tumors in the kidney, liver, etc.) appear to be composed of lymphocytes only; whereas a higher differentiation of the lymphoid tissue into follicles has been repeatedly described in pseudoleucæmia[1] (*e.g.* Arnold and Becker, *Arch. f. Ophth.*, vol. xviii., 1872; Boerma, *Arch. f. Ophth.*, vol. xl., 4, p. 219, 1894; Sporleden, *Inaug. Diss.*, Leipzig, 1897; *Nagel's Jahresbericht d. Ophth.*, p. 369, 1897; *Berl. Deutschmann's Beitr.*, vol. iv., p. 498, 1899).

4. A lymphosarcoma is a tumor showing aggressive tendencies, chiefly of a local infiltrative character, invading the nearest, and then the more remote, lymphatic glands, but probably not forming true metastases by way of the blood

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[1] In myelogenous leucæmia local tumors are rare and do not appear to have been recorded in the orbit. But chloroma is probably an example of a closely allied disease of the myelogenous hæmopoietic apparatus, in which local tumors, and especially symmetrical tumors of the orbits, are common. The cells of such growths, however, are not lymphocytes, follicles are never formed, and in general lymphoid structure is not imitated. These cases therefore lie outside the domain of the present discussion (see Hudson. A. C., *Roy. Lond. Ophth. Hosp. Reports*, vol. xviii., p. 153, 1911).

stream. Blood changes are absent. In general pathology the term is applied especially to certain mediastinal growths, probably originating in thymus remains, and to tumors commencing in the intestinal submucosa. The cells of such tumors may imitate, or caricature, the normal elements of lymphoid tissue, but apparently the higher differentiation into follicles is not usually attained. It is somewhat uncertain whether unequivocal proof of an origin from lymphoid tissue has hitherto been brought forward in any case of aggressive sarcoma of the conjunctiva, lids, or orbit (see p. 238).

5. The term lymphosarcomatosis designates an excessively rare condition in which the lymphoid tissue everywhere in the body proliferates and infiltrates (Adami). With this disease we are not here concerned.

RELATIONS OF THE LYMPHOMATOSES TO EACH OTHER AND TO THE INFLAMMATIONS.

Opposed to any sharp differentiation along these lines are the views of those who hold that the lymphoid processes are essentially not diverse, but one. The diagnosis, both clinical and pathological, between lymphosarcoma and pseudoleucæmia may be difficult, and lymphosarcoma approximates in many respects to ordinary round-cell sarcoma. It appears to be doubtful how far leucæmia and pseudoleucæmia are really separable; a mere enumeration of the white cells of the blood is not enough; a study of their morphology suggests that changes related to those of leucæmia are not absent in pseudoleucæmia. It is said, moreover, that characteristic leucæmic blood changes may develop, through time, in cases of pseudoleucæmia. According to the view of Türk the lymphocyte-forming apparatus is overactive in all the lymphomatoses alike. If the activity be great, and if it occur in a situation where access to the blood stream is easy, there will be an increase of white cells in the blood; if, on the other hand, access is difficult, there will be no blood changes and local tumors are more likely to form. The orbit, with its imperfect lymph apparatus, exemplifies these latter conditions, hence the comparative frequency of tumors in that situation.

Again, considering the important part played in inflammations by lymphocytes as an individual cell-type, and by lymph follicles, it may evidently be a matter of considerable nicety to apportion the relative shares of inflammation and new growth in some of these cases. Clinically at least, tubercle may imitate pseudoleucæmia, and, as has been seen, there may be some similarity in the histological changes in the glands.

From this standpoint the whole lymphoid group may be regarded as forming a series, bordering on the one hand on the chronic inflammations, on the other on the neoplasms; and an analogy will present itself (Adami) between lymphoma and fibroma, between pseudoleucæmia and the chronic hyperplastic inflammations, and between lymphosarcoma and the more undifferentiated forms of sarcoma.

In some instances again an overgrowth of lymphoid tissue may be neither an inflammation nor a neoplasm in the ordinary sense, but rather a response to some unknown bodily need. There is an age when the functions of the lymphoid-tissue-forming apparatus are active—the age of adenoids, enlarged tonsils, and conjunctival folliculosis without inflammation.

For the present, it would seem, we are not in a position to pronounce a final judgment on these problems. In the future perhaps some larger generalization may supply the correlating link.

THE OCULAR LYMPHOMATA OF LEUCÆMIA AND PSEUDO-LEUCÆMIA.

Passing from these difficult general questions, it may be said, as regards the local ocular manifestations of the lymphomatoses, that most symmetrical tumors of the eyelids and orbit belong to this group.[1] The tumors are commonly multiple and situated in the eyelids; they rarely invade the orbit deeply; they usually appear simultaneously with enlargements of lymph glands, etc., elsewhere, and with other signs of a constitutional affection. Instances are recorded, however, in which the orbit has been the seat of a lymphoid tumor while the lids remained free (Ahlström, *Klin. Monatsbl. f. Augenh.*, vol. xlii., 2, 276, 1904); of orbital preceding general signs by a period of two months (Ahlström); of an interval of three years between the involvement of the two orbits (Bronner, *VIIIth Internat. Ophth. Congress*, p. 202, 1894); and, in four or five cases (in some of which the diagnosis was doubtful or the period of observation short) of a unilateral incidence of the affection.

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[1] A few are due to the simultaneous invasion of both orbits by a sarcoma arising in some central situation, such as the sphenoid; a very few perhaps to invasion from one orbit to the other by way of the optic nerve or the sphenoid. It is doubtful if v. Mikulicz's disease should be classified apart from the pseudoleucæmic lymphomata.

DERIVATION OF THE LYMPHOMATA.

Regarding the origin of lymphoid tumors in general widely divergent opinions have been expressed, and the orbit has been the battleground of contending schools. According to one the growths arise from similar cells preëxisting in the tissues; according to the other they originate, by diapedesis, from the lymphocytes of the blood. One side considers that the tumors supply lymphocytes to the blood; the other that the blood supplies lymphocytes to the tumors. Those who derive the tumors from the blood appeal to the fact that lymphoid tissue has never been demonstrated beyond cavil in the normal orbit, and still less in the choroid where also lymphoid infiltrates occur.[1] In reply to this objection the upholders of an origin from preëxisting tissue cells point out that although lymphoid tissue may be absent from the orbit proper, it is present in two closely adjacent situations—the conjunctiva and the lacrimal gland. In agreement with this localization the majority of lymphoid tumors have been situated in the eyelid or lacrimal gland, or at least far forward in the orbit; indeed in some instances the conjunctiva itself has actually shown tumor formation (*e.g.* Axenfeld, *Arch. f. Ophth.*, vol. xxxvii., 4, p. 102, 1891; Boerma, *Arch. f. Ophth.*, vol. xl., 4, p. 219, 1894; Berl., *loc. cit.*; Collins, *Roy. Lond. Ophth. Hosp. Rep.*, vol. xiii., p. 248, 1893; Hudson, *Roy. Lond. Ophth. Hosp. Rep.*, vol. xviii., p. 153, 1911).

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[1] This question of the presence or absence of a lymphatic apparatus in the orbit has recently been subjected to renewed investigation by Birch-Hirschfeld (*Graefe-Saemisch Handbuch*, II. Teil, IX. Band, XIII. Kap., p. 261, 1909). In agreement with other observers he has been unable to find definite areas of lymphoid tissue; in the orbits of animals also he has never found follicles. His observations mostly referred to the orbits of newly born infants. He believes that a system of lymph *vessels* is demonstrable, but this question scarcely concerns the present discussion.

The more difficult case of lymphoid infiltration of the choroid (and also of the dura mater) in leucæmia has received various explanations.

1. That the lymphocytes are not really in the tissues but in the vessels, the walls of which are swamped and rendered invisible by the dense crowds of cells (Oeller).

2. That the infiltration is a secondary invasion from an orbital growth.

These two explanations certainly do not apply to all cases.

3. That the cells are truly heteroplastic—derived from other types of mesoblastic elements (Berl). It seems somewhat unlikely that a connective-tissue cell and a blood cell like a lymphocyte should be capable of this species of interchange. Hudson considers that possibly in leucæmia the endothelium may undergo a vicarious proliferation to compensate for a defective supply of mature blood cells from the bone marrow.

4. That under the "leucæmic stimulus" individual isolated lymphocytes may undergo proliferation and form local tumors (Meller). This explanation rests on a somewhat speculative basis.

5. The hypothesis of the opposite school—that the infiltrates are due to diapedesis from the blood. While possible enough in the case of leucæmic infiltrates of the choroid, this explanation is not easily capable of a general application to the case of lymphoid tumors without blood changes.[1]

On the whole the probabilities seem to be in favor of an origin of lymphoid tumors from preëxisting cells of the tissues, the condition being a local expression of a general overactivity of the lymphopoietic apparatus; but perhaps the time has scarcely come for a final decision on the subject. For a fuller consideration of these and cognate points, the reader is referred to the papers of Birch-Hirschfeld (*loc. cit.*),

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[1] Lymphoid infiltration of the choroid has been recorded in leucæmia only, not in pseudoleucæmia.

Meller (*Arch. f. Ophth.*, vol. lxii., p. 130, 1906; *Zeitschr. f. Augenh.*, vol. xv., p. 538, 1906), and Hudson (*loc. cit.*).

APPLICATION TO THE PRESENT CASE.

In the foregoing pages an endeavor has been made to present a general conspectus of modern views with regard to the lymphomatoses. In reality, however, much of this discussion is only indirectly germane to the present case, which differs in important particulars from all the above-mentioned conditions.

1. With the exception of the small nodules noted at the last examination (on the more recently affected side) there were no tumors large enough to be individually palpable. The "elastic tumor" mentioned in the clinical history probably consisted of displaced orbital tissues.
2. The condition was purely orbital; in particular there was no clinical evidence of an affection of the conjunctival lymphoid tissue or of a special localization in the lacrimal gland.
3. The discrete scattered nodules with well developed follicles were quite unlike the local formations of the true lymphomata.
4. The long interval between the involvement of the two orbits would be at least extremely exceptional in the lymphoma group.

One must agree with Birch-Hirschfeld therefore that the condition has closer affinities with the inflammations than with the neoplasms. Follicle formation is a well recognized response to an inflammatory stimulus, as is exemplified, for instance, in trachoma. It is true that it has been described also in pseudoleucæmic tumors; but apart from the fact that these pseudoleucæmic tumors, as has been seen, have themselves been suspected to have an inflammatory basis, the occurrence in the present condition of crops of isolated follicles along the vessels, the presence of plasma cells, and (in Birch-Hirschfeld's case) the observation of vascular disease—these are points much in favor of an inflammatory origin. The appearance of aggressive diffuse infiltration, and of disorganization of the tissues, in the present case was exceptional, and may have been due to interference with nutrition from mere overcrowding of the tissues with cells.

With regard to the genesis of the lymphoid tissue in the present case, the appearances were not such as entirely to exclude an origin from the conjunctival fornix or lacrimal gland; if Birch-Hirschfeld's views on the occurrence of lymphatic channels and vessels in the orbit be correct, the spread of the lymph nodules from these situations, and their distribution along the main vessels, where the perivascular lymph channels would presumably be best developed, would receive a sufficiently intelligible explanation. Yet in view of the fact that in neither of Birch-Hirschfeld's cases, nor in my own, was there any clinical evidence of a primary affection of the fornix or lacrimal gland, nor of any special concentration of nodules in their vicinity, it seems more probable that the follicles were locally deposited in response to the inflammatory stimulus, and that the conjunctiva and lacrimal gland merely shared in a general process. The mucous membrane of the ethmoid cells fell under suspicion at the time of operation, but on the whole the subsequent course of the case, and the peculiar character of the infiltration, seem to preclude this source.

The above analysis leaves many points totally obscure. The bilateral incidence, even after a long interval, would seem to point to some general dyscrasia, but what was its nature in a man who had apparently always enjoyed perfect health and who showed not even the beginnings of any constitutional disease after a period of observation extending over seven years? Again, why should the follicle formation occur in the two orbits and apparently nowhere else in the body; or may similar small scattered follicles have been present elsewhere without producing visible signs? The answer to these and kindred questions must rest on the basis of a larger material than is at present at our disposal.

DESCRIPTION OF FIGURES.

FIG. 1 (x 12). General view.

FIG. 2 (x 35). A higher magnification of one of the follicles showing its relations with a large artery (A). Some infiltration is present in the arterial wall itself, and a smaller artery below is ensheathed (B). A small collection of lymphocytes is also seen near an artery to the right (C).

Fig. 3 (x 150). More diffuse infiltration of the tendon of one of the ocular muscles.

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ILLUSTRATING DR. COATS'S ARTICLE ON "DISCRETE LYMPHOID INFILTRATION OF THE ORBIT."

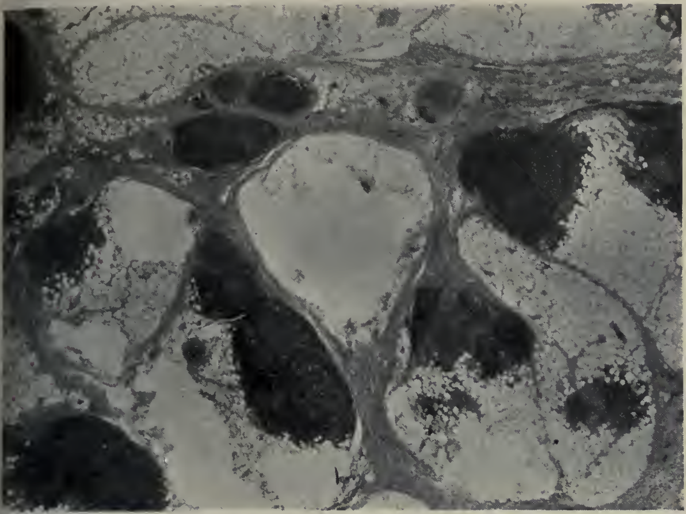

FIG. 1.—General view. (x 12.)

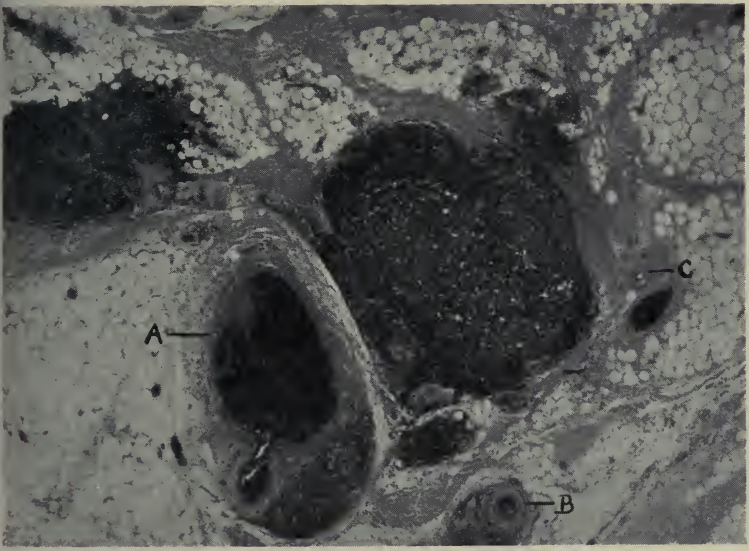

FIG. 2.—A higher magnification of one of the follicles showing its relation with a large artery (A). Some infiltration is present in the arterial wall itself, and a smaller artery below is ensheathed (B). A small collection of lymphocytes is also seen near an artery to the right (C). (x 35.)

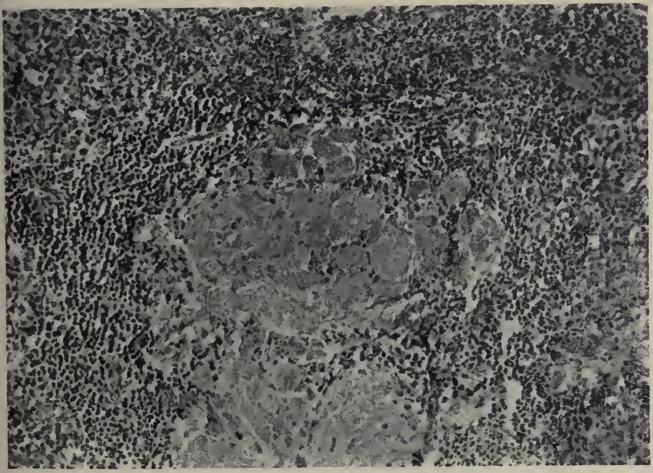

FIG. 3.—More diffuse infiltration of the tendon of one of the ocular muscles. (x 150.)

LYMPHOMA AND LYMPHOSARCOMA OF THE CONJUNCTIVA

By Dr. GEORGE COATS, London, Eng.

(*With three figures on Text-Plate No. VI.*)

I

LYMPHOMA

THIS specimen was derived from a small tumor of the plica semilunaris. The clinical diagnosis was "fibroma," but the original notes having been lost no further details are available.

Microscopically the growth may be said to consist of a single gigantic lymph follicle (Fig. 1) measuring 3.25*mm* in diameter. The imitation of normal lymphoid tissue is quite perfect. The main mass is composed of a "germ center" of comparatively large pale cells, among which the usual still larger elements with granular inclusions ("Körnchenzellen") are fairly abundant. This center is clothed with a mantle of typical lymphocytes, which in one place throws a strand across the follicle, dividing it into a larger and a smaller segment. Cells of the germ center type also occur outside this mantle on its deeper aspect. Vessels are small and scanty within the follicle; karyokinetic figures are not uncommon. The vessels of the vicinity have sheaths of lymphocytes, and a few cells of the same type invade the deeper layers of the epithelium, but in general the nodule is very well delimited from its surroundings; there is, however, no definite fibrous tissue capsule. A little lymphoid tissue is present in the adjacent conjunctiva, and in one situation a very minute deeply buried follicle is demonstrable.

In the preceding paper (p. 221) the question was discussed whether a diagnosis of simple lymphoma is ever justified, some pathologists holding that if the imitation of lymphoid tissue is exact then the differentiation between a chronic inflammatory hyperplasia and a true neoplasm is impossible; while, on the other hand, if the imitation is imperfect then the term "simple lymphoma" is erroneous. Without entering into this controversy, it is sufficient to say that if the name be appropriate to any condition it is to one such as the present, where a local, prominent, circumscribed tumor grew from the plica, without, probably, any other lesion of the conjunctiva. Yet even here the discovery of another follicle, however small, suggests that inflammatory hyperplasia may have played a part.

The following are the scanty similar observations which I have been able to find.[1]

1. Case of Koerber (*Zeitsch. f. Augenh.*, vol. x., p. 148, 1903). Female aged 14, in good health. Injury to L. six months previously with hot prune juice. Soft, freely moveable pink tumor the size of a pea, attached to the plica. Conjunctiva otherwise normal. Microscopically the tumor consists of a single nodule composed of lymphocytes with a few larger cells, and surrounded by a connective-tissue sheath. Scanty stroma within the nodule.

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[1] Certain conditions to which the name "Lymphoma" has been applied are here excluded from consideration, viz.:

1. The leucæmic and pseudoleucæmic tumors mentioned in the preceding paper.

2. A peculiar type of diffuse lymphoid infiltration affecting the tarsal conjunctiva (Baslini, *Clin. Oculist*, 1907, May; *Nagel's Jahresbericht*, 1907, p. 187; Nathausen, quoted by Cosmettatos, *Arch. f. Augenh.*, vol. lxvii., p. 391, 1910), fornix and its vicinity (Valude and Morax, *Ann. d'Oc.*, vol., cxxvii., p. 190, 1902), or bulbar conjunctiva (v. Duyse, *Arch. d'opht.*, vol. xxv., p. 402, 1905; Uhthoff, quoted by v. Duyse, *loc. cit.*).

3. A condition described by Goldzieher (*Centralb. f. prakt. Augenh.*, p. 112, 1893) in which a development of colossal follicles in both lids of one eye is associated with enlargement of the cervical glands. The description strongly suggests an inflammatory lesion.

4. A disease mentioned by v. Michel (*Lehrb. d. Augenh.*, 2d ed., p. 199, 1890) in which a reddish gray thickening of the conjunctiva in the palpebral fissure, and sometimes surrounding the cornea, is associated with multiple enlargement of lymphatic glands.

The propriety of designating some of these conditions "Lymphoma" need not here be discussed; all of them differ essentially from the case now under consideration.

2. Case of Morax (Soc. d'opht. de Paris, July 7, 1908, *Rec. d'opht.*, pp. 174 and 301, 1908). Male aged 19. At inner angle of eye separated from caruncle by a space of 1*mm*, a yellowish red, conical tumor measuring 9–10*mm* vertically, 7–8*mm* horizontally, 5*mm* in height; firm in center, softer at sides; not attached to sclerotic. A similar smaller lobulated growth was present in the other eye. Microscopically composed of diffuse cellular infiltration and some fairly voluminous nodules. Cells have an irregularly spherical nucleus, and little protoplasm; no granule cells or giant cells; polynuclear leucocytes rare; surrounding tissues vascular; no well defined capsule. Morax considers the condition to be either a chronic inflammation or "that type of lesion which is described under the name of lymphoma."

3 Case of Teulières (*Rec. d'opht.*, p. 161, 1910). Male aged 15. A tumor of fairly firm consistence measuring 8*mm* by 5*mm* grew from bulbar conjunctiva, 5*mm* outside the caruncle. Of some years' duration. Mobile on the sclera. Consists of typical lymphoid tissue in full activity of development.

4. Case of Cosmettatos, (*Arch. f. Augenheilk.*, vol. lxvii., p. 391, 1910). Male 18. Enlarged tonsils and cervical glands. On bulbar conjunctiva close to limbus a small, flattened, pale red, soft, smooth tumor measuring 8*mm* by 5*mm*. History of eight years' duration. Conjunctiva and fornix otherwise normal. Blood normal. Microscopically composed of lymphoid cells, in places collected into masses of various forms and separated by fibrous strands; in places the infiltration is more diffuse, but contains here also small lymph nodules.

Analyzing these results, it would seem that simple lymphoma has been observed in young people (average 16.5 years; 3 male, 1 female) and is a tumor of slow development. It has grown always from the inner portion of the conjunctiva—three times from the plica, once from a point 5*mm* outside the caruncle, once near the limbus. Once there was a history of previous injury; once the tumor was bilateral and symmetrical; in no case is mention made of any abnormality of the conjunctival lymphoid tissue elsewhere; in one instance there was simultaneous enlargement of the tonsils and cervical glands. The tumor apparently never attains any very considerable size (largest recorded diameter 10*mm*) even after a lapse of some years. An absolutely typical formation of follicles with germ centers appears to be described only in the present instance, but may have been present in the cases of Morax and Cosmettatos.

II

LYMPHOSARCOMA

Summary.—Tumor of the left conjunctiva of two months' duration, in a woman aged 29. A pedunculated pale red growth arises from the whole extent of the upper fornix, and in the lower tarsal conjunctiva there are several tuberculated masses. Repeated recurrences after removal. Finally extension back into the orbit, enlargement of a cervical gland, loss of health, and jaundice. Blood examination negative.

Microscopically the tuberculated masses from the lower conjunctiva show in general the structure of lymph follicles, but with certain minor differences. The main tumor consists of similar cells in larger masses, and with more tendency to a diffuse infiltration and invasion of the surrounding tissues. The recurrences show aggressive infiltration of a highly malignant type.

A woman, aged 29, came under the care of Mr. Lang at the Royal London Ophthalmic Hospital on February 5, 1906.[1] About the beginning of December, 1905, she had observed a slight swelling in the outer-upper part of the left upper eyelid. Something could be felt slipping about beneath the lid and pushing it forward. There was no pain, redness, or discharge. Fourteen days before her visit a tumor began to present in the outer part of the palpebral fissure. It was increasing fairly rapidly in size, and was associated with slight conjunctival discharge.

A pale red swelling was observed, protruding from beneath the upper lid, and filling the palpebral fissure in its outer part. It measured about 2.5*cm* by 1.5*cm*, was smooth on the surface, of solid consistence, and somewhat vascular. It covered a little more than one third of the upper-outer quadrant of the cornea. On raising the upper lid it was seen to arise by an elongated pedicle from the whole extent of the fornix, but with a broader attachment on the outer side. In the lower tarsal conjunctiva there were several raised, pale tuberculated masses. The globe was intact; no exophthalmos, or limitation of movement, no invasion of the orbit.

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[1] The earlier history of this case has already been reported by Henderson (*Trans. Ophth. Soc.*, xxvi., 1906, p. 32).

The patient's health was, and had always been, good. A brother had suffered from "consumption of the bowels," a nephew from tuberculosis of the ankle. A blood examination gave the following results:

Hæmoglobin	85%
Red corpuscles	3,400,000
White corpuscles	5,800
Polymorphonuclears	57%
Lymphocytes	33%
Large mononuclears	8%
Eosinophiles	1%
Mast cells	1%

On February 26th the pedunculated tumor and as much as possible of the growth in the fornices were removed. On March 10th there was recurrence along the whole line of the upper fornix. The lower fornix was thickened and nodular, but without definite tumor formation. A further excision was performed but the growth recurred once more and was again operated upon in July. A note made on Oct. 13th stated that the fornices were free, but that a granular-looking mass 5*mm* in diameter and covered with minute spots of hemorrhage projected from the outer half of the tarsal conjunctiva. In the bulbar conjunctiva and surrounding the inner half of the cornea there was a raised gelatinous-looking swelling which appeared to encroach on the edge of the cornea. An enlarged gland was palpable in the neck.

A month later the growth was spreading back into the orbit, and the patient was jaundiced and had obviously lost flesh. She was referred to a general hospital, but no details of her further progress are obtainable.

Microscopical Examination. Specimens from the lower conjunctival fornix, from the pedunculated growth, and from the recurrent nodules are available. In the first of these the incipient stage of tumor formation is plainly manifest. The imitation of lymph follicles is unmistakable (Fig. 2). Isolated rounded agglomerations of cells are separated and delimited by fibrous strands quite in the manner of trachoma follicle formations. A more minute inspection however reveals certain points of distinction.

(1) Lymphocytes are present in the periphery in small numbers only, and do not form a complete mantle round the germ center as in ordinary follicles.

(2) The cells, and especially the cell nuclei vary more in size. Some very large deeply stained nuclei with prominent

chromatin dots are visible. In general the nuclei are comparatively large, and round or slightly irregular in figure; chromatin dots are common; the protoplasmic body, while not very large, considerably exceeds that of a lymphocyte.

(3) On the other hand large cells with granular inclusions (granule cells, Körnchenzellen) are very scanty and multinucleated cells appear to be absent; an intercellular reticular stroma is easily demonstrable.

The cells show little tendency to transgress the limits of the follicles; in the surrounding trabeculæ there are some small tracks of lymphocytes, and one or two isolated plasma cells. No plasma cells can be found at any considerable depth within the follicles.

A further stage in the evolution of the growth is exemplified by the collection of similar cells into larger masses, which now no longer resemble follicles. The limits of the nodules are still fairly well defined however, though strands of cells extend into the surrounding tissues. The surface epithelium is rarefied, and to some extent invaded from below. In the vicinity of some of these masses there is a more diffuse infiltration of the conjunctiva, without well defined limits, and with no formation of nodules.

The pedunculated growth represents a further development of the same process. It is composed of uniformly distributed similar cells, for the most part less crowded than in an ordinary round-celled sarcoma. Granule cells are absent. A reticulum is not so prominent as in the follicle-like growths of the conjunctiva, but is traceable. Karyokinetic figures can be found but are scanty. There is a not very abundant, evenly distributed network of vessels, usually with well developed walls. Some round empty spaces may represent the badly formed vessels which are common in sarcoma or may be due to degeneration; the cells in their immediate vicinity, however, are well preserved. There is no necrosis *en masse*, hemorrhage, or pigmentation.

In the recurrences the cells are of the same type, but are more uniform in size and usually more densely crowded; a reticulum is still visible. The recurrences show aggressive infiltration of the most pronounced kind, the cells invading the underlying tissues without restraint and in all directions (Fig. 3).

The differentiation of lymphosarcoma from the ordinary round-celled variety of the neoplasm must of necessity be a matter of some difficulty, especially when exuberant growth has masked some of the original characteristics of the tumor. An unassailable diagnosis would demand:

(1) Clinical evidence of an origin from the lymphoid tissue of the conjunctiva, or at least from a situation where lymphoid tissue is normally present.

(2) Pathologico-anatomical evidence to the same effect.

(3) Histological features not necessarily reproducing with exactitude the characteristics of lymphoid tissue, but at least indicating some of its special peculiarities.

Applying these standards to recorded cases of sarcoma of the conjunctiva it is found in the first place that the vast majority have their origin in the bulbar conjunctiva, especially near the limbus, perhaps because of the frequency of congenital moles in this situation. Since lymphoid tissue is not normal in this situation these may be excluded from the present analysis. Of the cases arising from the conjunctiva of the fornix or lids some have been pigmented, and some spindle-celled. Excluding these also, there remains a very small residue of tumors which, being round-celled, unpigmented, and derived from the tarsal or fornical conjunctiva, may be compared in some measure with the present observation. Of these the following may be quoted:

1. Case of Prout and Bull (*Arch. f. Augenh.*, vol. viii., p. 221, 1879). Female, aged 18. Smooth, flat, hard tumor involving conjunctiva of right lower lid from lid margin to beyond fornix, near outer canthus; slight invasion also above the canthus. Skin free. Trachoma present. Did not grow during a period of six weeks. Microscopically an unpigmented round-celled sarcoma, with some irregularly distributed spindle cells and a few small vessels. Masses of amyloid material in its depths and some amyloid infiltration of the walls of the smaller arteries and capillaries. This may have been a case of amyloid degeneration of the conjunctiva, with the lymphocytal infiltration which always accompanies that condition.

2. Case of Ceppi (Soc. Anat. de Paris, Nov. 26, 1880, *Ann. d'Oc.*, vol. lxxxv., p. 271, 1881). Child aged 5, lobulated, fleshy, firm, elastic tumor, size of a large nut, projecting 0.5*cm* from the left palpebral fissure. Free and mobile, attached only at fornix, appears to be covered with conjunctiva, and adheres slightly to the caruncle. Preauricular gland palpable. History of three weeks' duration. After removal it recurred in two months at the level of the car-

uncle, invaded the orbit, and caused death. Microscopically a round-celled sarcoma.

3. Case of Chisholm (*Virginia Med. Monthly*, May, 1881; *Ann. d'Oc.*, vol. lxxxv., p. 270, 1881). Female, aged 5, delicate and anæmic. Spherical tumor attached to mucous membrane of the fornix by means of a short very vascular pedicle. Microscopically a round-celled sarcoma.

4. Case of Feilchenfeld (*Centralbl. f. prakt. Augenh.*, vol. xii., p. 97, 1888). Female, aged 16. Circumscribed brown-red tumor attached by a broad base to the tarsal conjunctiva of the left upper lid from its margin to the fornix, and occupying the lid laterally nearly as far as the canthus on each side. Conjunctiva rough over the center of the tumor. Microscopically an unpigmented small round-celled sarcoma, with a scanty, fibrous stroma and some large vessels near the fornix. Some invasion of the tarsus. No amyloid degeneration.

5. Case of Roy (*Ann. d'Oc.*, vol. cxl., p. 338, 1908). Male, aged 6. Enlarged cervical glands, tonsils, and adenoids, but otherwise in good health. No evidence of tubercle or syphilis. Pedunculated tumor of right conjunctiva arising from the whole length of the fornix. Covered with conjunctiva but ulcerated in places. Microscopically composed of small round cells of various sizes, with slight fibrous stroma, and in places with a tendency to an alveolar arrangement; here and there the cells are fusiform. Some of the vessels have very imperfect walls. No pigmentation. Rapid growth with invasion of the capsule of Tenon, but no recurrence six months after operation.

6. Case of Rschanitzin (*Klin. Monatsbl. f. Augenh.*, vol. xlvii., ii., p. 167, 1909). Female, aged 7. Enlarged follicles in both conjunctivæ. Swelling of left upper lid of nine months' duration, following a blow. Tumor invading fornix, plica, and caruncle and extending from the inner canthus for three quarters of the length of the lid. The cornea is surrounded by the tumor on the nasal side. Microscopically an unpigmented round-celled sarcoma. The author's second case seems to have originated in the lid, not in the conjunctiva.

7. Case of Esipoff (40 Sitz. d. Moskauer augenärztl. Gesellsch., *Westn. Ophth.*, 1904. Quoted by Rschanitzin). Female, aged 11. Tumor of left lower lid invading plica and

caruncle. Microscopical diagnosis: Round-celled lymphosarcoma.

8. Case of Finden (quoted by Rschanitzin without reference). Female, aged 69. Tumor of conjunctiva of right upper lid. Microscopically an unpigmented round-celled sarcoma.

9. Case of Piccoli (quoted by Rschanitzin without reference). Tumor the size of an almond growing from the plica. Microscopical diagnosis—lymphosarcoma with disease, and in places with obliteration, of the vessels.

Rschanitzin quotes also cases of unpigmented round-cell sarcoma of the conjunctiva reported by Michel and de Vieto Vollaro, but without giving references or exact details.

Analysis shows that the tumors had a broad attachment to the tarsal conjunctiva of the lower lid from the margin to the fornix in the case of Prout and Bull; its situation was similar but in the upper lid in the case of Feilchenfeld; it arose from the fornix in the cases of Ceppi, Chisholm, and Roy; from the fornix, plica, and caruncle in the case of Rschanitzin; from the plica and caruncle in the case of Esipoff; from the plica (the favorite seat also of lymphoma, see p. 237) in the case of Piccoli. In the case of Roy there was hypertrophy of the lymphoid tissue of the tonsils, pharynx, and cervical glands; in that of Rschanitzin enlarged follicles were present in *both* conjunctivæ; in that of Prout and Bull there was trachoma. The preauricular gland was palpable in the case of Ceppi. Lobulation is mentioned by Ceppi; the occurrence of amyloid degeneration by Prout and Bull; of disease of the vessels by Prout and Bull and Piccoli. Growth was rapid in the cases of Ceppi and Roy; slow in that of Prout and Bull. Except in the case of Finden, concerning which few details are available, all the patients were young.

It will be noted that in none of these instances was there specific evidence of an origin from lymphoid tissue; indeed a diagnosis of lymphosarcoma as opposed to ordinary round-celled sarcoma was asserted only in the cases of Esipoff and Piccoli—on what particular grounds is not clear from the abstracts available to me. The attachment of the growth to the fornix by means of an elongated pedicle constitutes a special point of resemblance between the present case and the cases of Chisholm, Ceppi, Roy, but that this is a feature not peculiar to lymphosarcoma is shown by its occurrence in other forms of sarcoma which have a similar point of origin from the fornix, *e.g.* in spindle-celled sarcomata recorded by Talko (*Klin. Monatsbl. f. Augenh.*, vol. xi., p. 326, 1873) and Dyer (*Trans. Amer. Ophth. Soc.*, vol. ii., p. 538, 1879) and in a melanotic sarcoma reported by Horner (*Klin. Monatsbl. f. Augenh.*, vol. ix., p. 4, 1871).[1] Angiomata in the same situation are also sometimes pedunculated. It would seem therefore that the formation of a pedicle is an accidental circumstance, due most probably to the looseness of the tissue from which the tumor springs, and to the modeling action of movements of the lids.

It may perhaps be claimed that the evidence of an origin from lymphoid tissue is more unequivocal in the present case than in any of these. Clinically the growth began in the fornix where normally lymphoid tissue is found; the "raised, pale, tuberculated masses" suggested a proliferation of lymphoid tissue such as is seen in trachoma; their presence in the conjunctiva of the lower lid, separate from the main tumor mass, together with the extensive involvement of the upper fornix, might seem to indicate that the lymphoid tissue over a considerable area had undergone a simultaneous malignant transformation, but of course invasion by continuity cannot be excluded. The pathological evidence seemed to complete the proof. It showed that the tuberculated masses did in fact closely imitate trachoma follicles, and that between them and the more developed portions of the tumor a series of transitional stages could be traced. In the histological type of its cells also, and still more in the presence of a well developed intercellular reticulum the growth presented points of approximation to normal lymphoid tissue and differed from ordinary round-celled sarcoma. It should be noted that the imitation was of the larger cells of the germ center rather than of the lymphocytes which surround it in the normal follicle. Probably therefore these should be looked upon as the parent cells of the tumor.

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[1] v. Duyse and Cruyl (*Ann. d'Oc.*, vol. xcviii., p. 112, 1887) also describe a pedunculated sarcoma attached to the palpebral conjunctiva alone, but without mentioning the form of the cells.

ILLUSTRATING DR. COATS'S ARTICLE ON "LYMPHOMA AND LYMPHOSARCOMA OF THE CONJUNCTIVA."

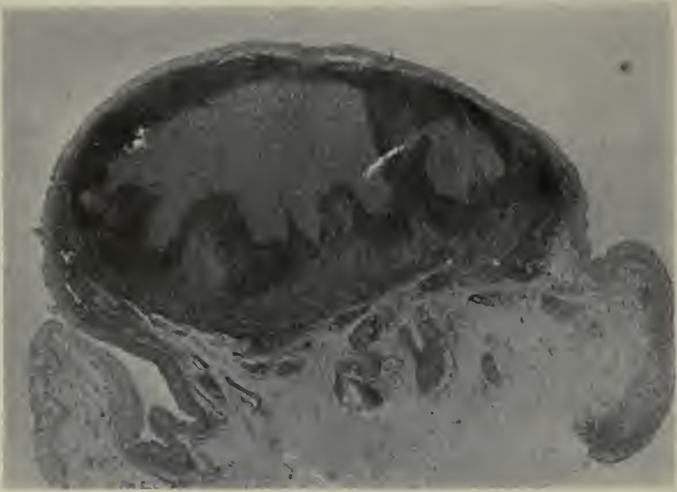

FIG. 1.—Lymphoma of the conjunctiva. The paler "germ-center" is well seen with its mantle of crowded and deeply stained lymphocytes, the whole forming an enormous lymph follicle.

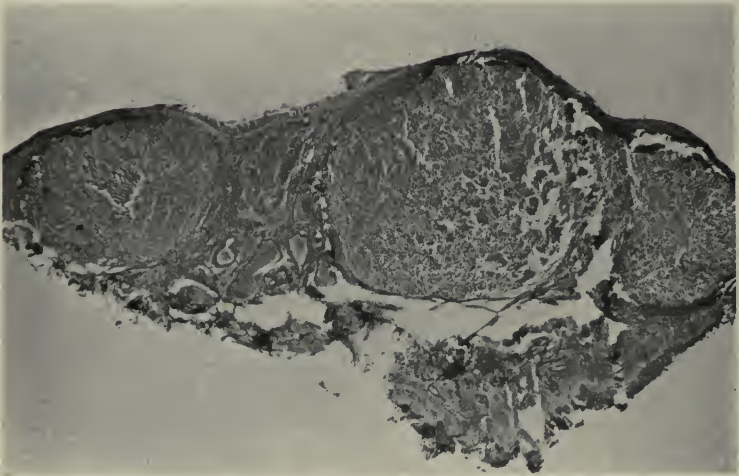

FIG. 2.—Lymphosarcoma of the conjunctiva. An early stage of the growth in which the imitation of trachoma follicles is very clearly visible. (x 25.)

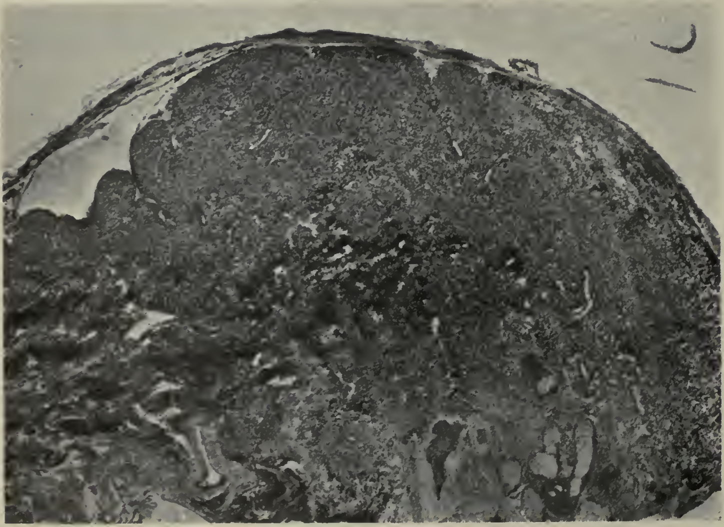

FIG. 3.—From one of the recurrences. Showing diffuse infiltration, with no imitation of follicles, and invasion of the subjacent tissues of an aggressive type. (x 34.)

In one respect a difference from the text-book descriptions of lymphosarcoma is to be noted (see p. 228)—extension appeared to be in part by metastasis and not by local invasion alone. Since, however, when the patient was last seen, an enlarged gland was palpable in the neck, spread by continuity cannot be wholly eliminated. In any case the histological evidence already detailed seems sufficient to establish a diagnosis of lymphosarcoma.

DESCRIPTION OF FIGURES.

FIG. 1. Lymphoma of the conjunctiva. The paler "germ-center" is well seen with its mantle of crowded and deeply stained lymphocytes, the whole forming an enormous lymph follicle.

FIG. 2 (x 25). Lymphosarcoma of the conjunctiva. An early stage of the growth in which the imitation of trachoma follicles is very clearly visible.

FIG. 3 (x 34). From one of the recurrences. Showing diffuse infiltration, with no imitation of follicles, and invasion of the subjacent tissues of an aggressive type.

ANOMALOUS NERVE HEADS WITH GOOD VISION.[1]

By Dr. MICHAEL GOLDENBURG, Chicago, Ills.,
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(*With one colored plate.*)

ANOMALOUS nerve head is comparatively rare. A careful study of the contemporaneous literature shows that this interesting condition has not been treated exhaustively.

The few cases reported show great variety in many aspects, so that one experiences considerable difficulty in an attempt at accurate classification, with regard to the diagnosis and histogenesis of this anomaly.

We know that in the lower animals we find pigment quite frequently, the extent largely depending upon the color of the skin. It is found in the lamina cribrosa and may be so extensive as to hide the non-pigmented tissues, so that the nerve head may appear black.

In all birds, many reptiles, and some mammals a special vascular organ, the pecten, is found projecting from the disk into the vitreous. Structurally it is homologous with the ciliary processes, consisting of a vascular plexus covered by pigmented cells, and is probably analogous to them in function as a secreting organ. It occurs in its most complicated form in birds, but it varies considerably in shape in various animals, being most rudimentary in rodents and marsupials. Amongst the latter, the form found in the rat kangaroo, the rabbit-eared perameles, and others is approximated in rare cases in man. These cases, however, are probably not vestigial, but pathologic new-formed vessels (1).

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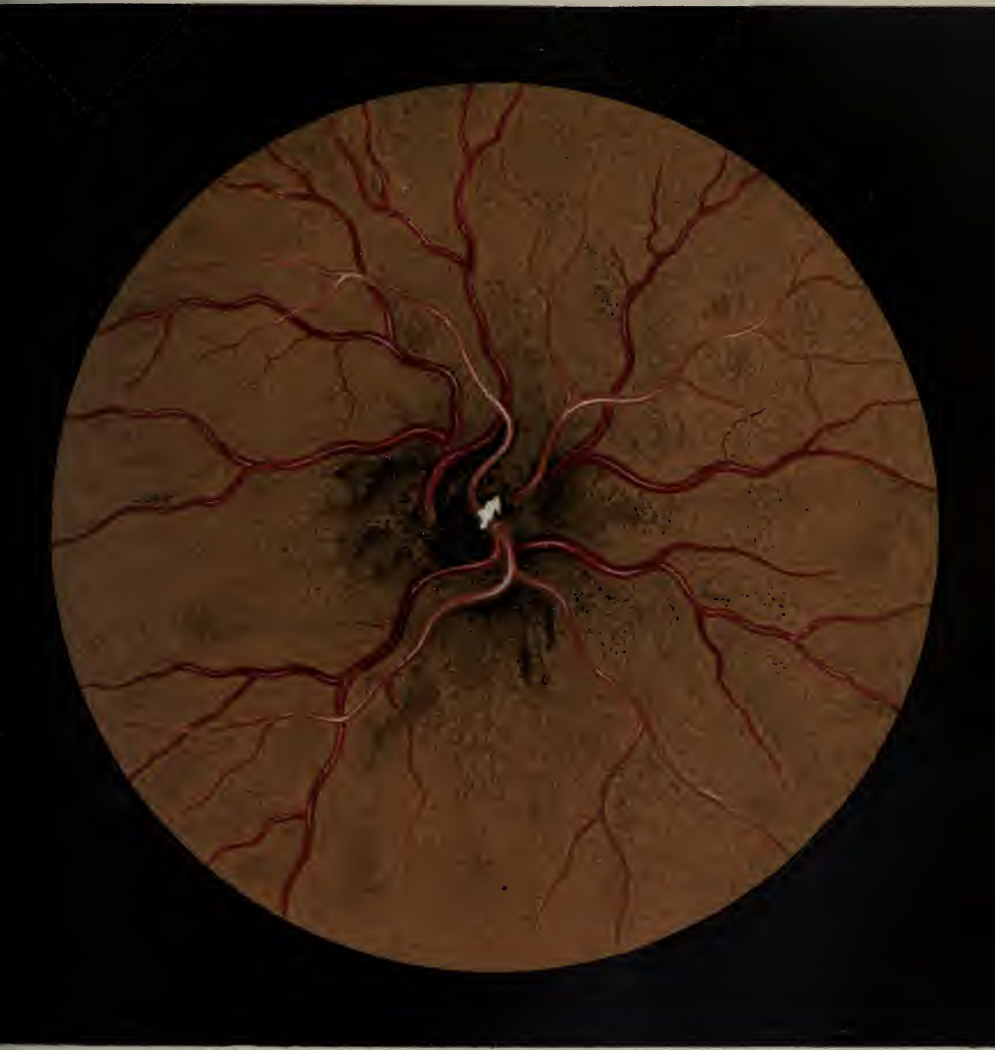
[1] Read before the Chicago Ophthalmological Society, February 16, 1914.



Dr. Goldenburg's Case of Anomalous Nerve Head with good Vision.

As regards the human eye, we know that normally the caliber of the optic nerve is more constricted at the internal than at the external opening, and that there is entire absence of pigment.

Ogawa reports a series of eighteen cases in man, which he has studied, several of which were his own. He found the pigment on the disk to be limited to within 0.2*mm* of the disk margins, the disk margin itself being well defined in all his cases (2).

L. Pick found in microscopic sections of the embryo before the seventh week, when the inner pigment layer of the eye is formed, that well developed pigment strips can be seen emanating from the pigment layer of the eye and extending far into the future optic nerve, long before its fibers are developed. It is probable, he states, that these pigment masses in individual cases continue to persist in the optic nerve instead of retrogressing and accumulate as individual collections of pigment. He is inclined to think that we have to deal with a histologic inhibition.

Ogawa commenting on Pick's hypothesis concedes its attractiveness but maintains that from an embryologic point of view it is not based on absolute facts. He finds himself in no position histogenetically to confirm Pick's brief statement as regards the development of the optic nerve from a stage of pigmentation, for in textbooks on embryology not the slightest insinuation of such a process is recorded.

Ogawa has made microscopic examinations of embryos in the third month and has been unable to detect even a trace of pigment of the optic nerve. Professor Hertwig, whom Ogawa consulted, knew nothing of the pigmentary stage of the optic nerve and indeed repeated and careful examinations of embryos, varying from the fourth to the twelfth week, have not shown any pigment of the optic nerve. From this Ogawa concludes that the optic nerve does not pass a stage of pigmentation embryologically, but that individual pigmented connective-tissue cells occur histologically in the tissue of the lamina cribrosa, and that we have to deal with congenital anomalies.

From an anatomic study of this region in the developed eye, we find that the lamina vitrea is the only membrane that is in continuous contact with the optic nerve. According to Salzmann the other layers of the choroid are separated from it by the scleral ring or border tissue, as Elschnig calls it. The elements forming the scleral ring probably extend inward in connection with the scleral elements proper, to form the lamina cribrosa. Pigment cells of the choroidea (chromatophores) enter into the composition of the border tissues in varying amount. He further states of the lamina cribrosa: "The majority of the structural elements seem, however, to come out of the border tissue."

One always finds a few fine, elastic fibers radiating out of the border tissue into the framework of the optic nerve at the level of the choroid, but they are limited to the immediate neighborhood of the border tissue. The frame of the choroidal portion of the optic nerve as a whole consists entirely of glia, and only the more outspoken transverse course and the greater size and richness of the fibrillation bring to mind and seem to justify the name lamina choroidalis in the lamina cribrosa (3).

We can conclude, then, that the lamina cribrosa is a continuation of the inner scleral layers and the choroid, and that the border tissue or scleral ring either belongs to the choroid, the sclera, or is a continuation of the pial sheath. Again we may have hypertrophy of existing individual pigment cells, which are frequently histologic in these places, or possibly the presence of migrated germinal masses. Accordingly we may assume that it is quite possible that, instead of the scleral fibers, the choroidal fibers could predominate in the formation of the lamina cribrosa. Furthermore, in view of the fact that the so-called scleral ring, or more correctly speaking, the border tissue, is only a point where the supporting tissues meet and merge, division is made for the purpose of description only. In referring to the scleral ring Salzmann says: "I prefer Elschnig's term, the border tissue, because it does not commit one to anything."

In the light of the above-quoted variable views the following case which has come under my observation presents some interesting features.

W. V., æt. 19, male, negro, came to our clinic for the correction of an alternating squint, which had been present as long as he can remember. He was born in the South, whence he arrived a comparatively short time ago. His parents are negroes of his type, particularly as regards the intensity of pigmentation. He possesses the average intelligence of one who has had an education equivalent to two or three grades of our public schools. He has a rather high forehead, but aside from that possesses all the typical characteristics of the negro free from racial admixture. There is a history of eye trouble for the past six years, consisting largely in inability to read for any length of time without pain and excessive lacrimation. About five years ago he had glasses fitted. Probably the principal reason that forced him into our clinic was his inability to obtain a coveted position, owing to this squint.

On examination of the eyes last October, we found a concomitant convergent squint present, with the right acting as the fixing eye, although vision is better in the left. He is able at this time to read with his right eye $\frac{20}{50}$ and with his correction $+ 1 \smile + 50$ axis 150° $\frac{20}{40}$. The left $\frac{20}{33}$ $+ 1 \smile + 50$ axis 150° $\frac{20}{25}$. The tension, cornea, anterior chamber, and pupillary reaction are negative. The iris is heavily pigmented and dilates perfectly, the lens and vitreous are also negative. On examination of the fundus we noted the following peculiar anomaly: an attempt to locate the disk as a preliminary step to a more detailed examination proved apparently futile. Tracing the vessels from the periphery to the point of convergence did not seem to help us in locating anything that might resemble the disk. However, at the point where the vessels apparently come together and where the nerve head should be, we found a very small intensely white spot, that appears with the ophthalmoscope about the width of an artery and in length about two or three times that dimension, with its long axis directed to about two o'clock. The exact nature of this spot we are unable to define at this time. The vessels appeared negative in every respect. The retina is normal with the exception of a marked pigmentation which is very intense in the region of the nerve head, but gradually assumes a lighter shade as we proceed toward the periphery, no evidence of the nerve head or disk margins being present. The fields of vision are markedly contracted, to 20° up, in, and down and 50° out; the margins appearing serrated in outline. The interrelation of colors appears to be normal. The same picture exists in both eyes.

The problems presented by this case are not easy of solution. What is the white spot? Is it the remains of the hyaloid artery with a possible proliferation of pigment obscuring the disk margins or have we to deal with a small optic nerve with apposition of the disk margins as indicated by the contracted fields? If this condition is to be accepted as inflammatory in character we fail to find a basis for it, owing to the absence of a perivasculitis while the black pigment fades off gradually. The absence of the fine feathery arrangement and the restriction to a limited area speak against the hypothesis of degeneration. The fields give evidence of a markedly reduced number of individual nerve fibers. The color and massed appearance, with the gradual shading off as we leave the center, present the appearance of a preponderance of retinal pigment.

The theory of a pigmentation of the disk is very difficult of reconciliation with many phases of this condition, but on studying the anatomy of this part more closely, we can with some degree of reliability present an explanation of this anomaly.

Judging from the cases of pigmentation of the disk reported in the literature we find this phenomenon is much more common than we have been led to believe. Nearly all the pigment spots, varying from the size of a pin-point to about one fifth the size of the disk, are limited to within the scleral ring; in other words, the disk margins are well defined (4).

Neeper reported a case of annular pigmentation around the disk which obscured about one fourth of the edge (5).

Parsons reported two cases in which pigmentation extended upon the disk. But in none of the cases reported was the entire scleral ring obscured (6).

Beard of Chicago, however, reported a case in 1901 which he described as "Congenital Absence of Optic Disks, Simulating Choked Disk." In his case the disk margins were entirely absent, but no pigmentation was present (7).

The question arises, if pigmentation is present in the disk, where does it come from, and what anatomical cause or causes are responsible for its stopping just at the margin? This must remain unanswered for the present.

It might be well to mention at this time that of all the cases reported, not one has been studied both ophthalmoscopically and microscopically.

Apparently that which appears so well defined on ophthalmoscopic examination in the normal, cannot be so easily differentiated on exact microscopic investigation.

My own case probably represents a marked exaggeration of the pigment cases we have been able to find in the literature, plus a possible small optic nerve, or an optic nerve of unusually small caliber, with the margins of the retina probably in direct contact with each other, so that it obscures the region of the disk, with a marked proliferation of the pigment epithelium.

In conclusion I beg to say that I realize that I have been unable to cover all points of interest, but it is hoped that contributions by men who have opportunities for observation will shed additional light on this rather obscure anomaly.

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PLASMOMA OF THE LACRIMAL SAC.

By Dr. F. H. VERHOEFF and Dr. G. S. DERBY, Boston, Mass.

(From the Massachusetts Charitable Eye and Ear Infirmary.)

(*With four figures on Text-Plate No. VII*)

THE following is believed to be the only case of plasmoma of the lacrimal sac yet reported. It is probable, however, that other cases have occurred but have escaped recognition owing to the infrequency with which the lacrimal sac has been examined microscopically.

K. E., male, 38 years old, married, Armenian laborer; was seen by one of the writers at the Infirmary on December 10, 1912. The history he gave was that nine months previously there was a little swelling in the region of the left tear sac, which broke, discharged, and later healed. Two months later, the swelling returned and has remained.

Examination showed a rounded, hard, elastic swelling rather low down in the region of the left tear sac, 10*mm* long and 8*mm* broad. The swelling did not disappear on pressure. It felt as though it were adherent to the bone. The lower canaliculus had been previously slit. A probe could not be introduced into the sac, and nothing could be evacuated on pressure.

Along the tarsus of the left lower lid, extending from the canthus, was a flat, yellowish growth 6*mm* long and 3*mm* broad and a little less than a millimeter in thickness. In appearance, it was somewhat like granulation tissue, but of harder consistency. The color was a yellowish red. The caruncle was enlarged and surmounted with a curious yellowish, waxy-looking border. The semilunar fold was thickened, and its edge also presented the same appearance.

The conjunctiva of the inner part of the tarsus of the upper lid looked somewhat thickened. The remainder of the conjunctiva of the upper lid was somewhat reddened

ILLUSTRATING DRS. VERHOEFF AND DERBY'S ARTICLE ON PLASMOMA OF THE LACRIMAL SAC.

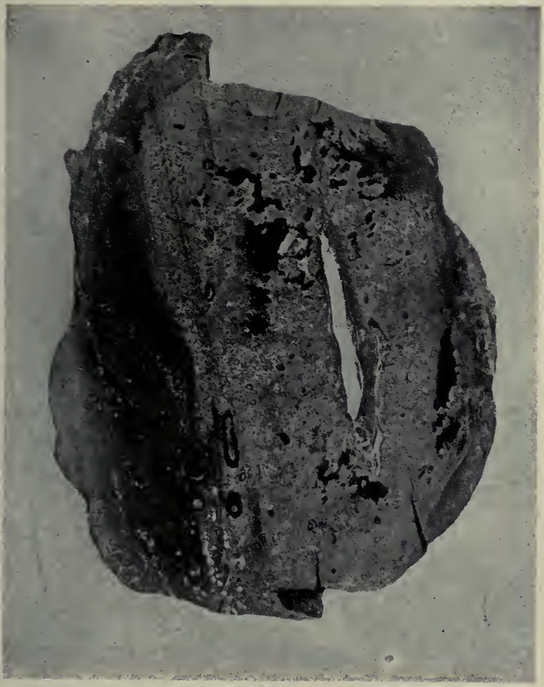

FIG. 1—Plasmoma of the lacrimal sac, phosphotungstic acid hæmatoxylin stain. The lumen of the sac is compressed owing to the infiltration of the adenoid layer with plasma cells. The hyaline masses are stained black. Hyaline rings may be seen around some of the blood-vessels. Photo magni. x 8.3.

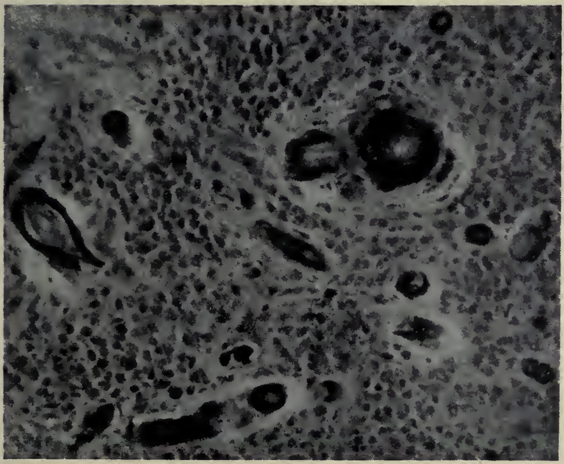

FIG. 2—Showing plasma cells. Also hyaline in walls of small blood-vessels. Photo magni. x 250.

ILLUSTRATING DRS. VERHOEFF AND DERBY'S ARTICLE ON PLASMOMA OF THE LACRIMAL SAC.

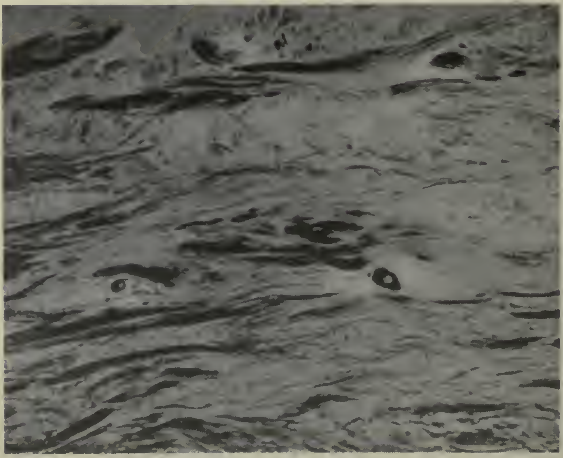

FIG. 3.—Elastic fibres fusing into hyaline masses. Special stain. Everything but the elastic tissue and hyaline is decolorized. Photo magni. x 125.

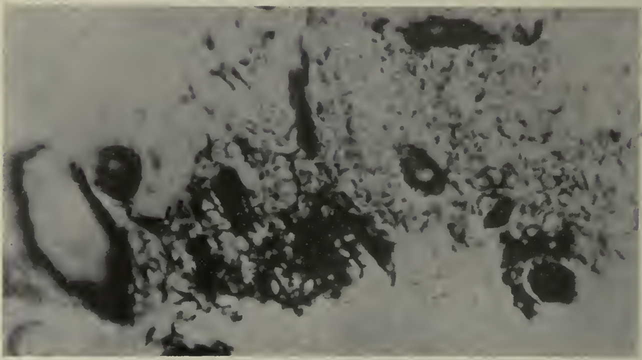

FIG. 4.—Reticulum of elastic tissue fusing into hyaline masses. Special stain. Everything but the elastic tissue and hyaline is decolorized. Photo magni. x 250.

and showed scars of an old trachomatous process. Small scars were present in the central part of the cornea of each eye. There was a pterygium of moderate size.

The conjunctiva of the right eye showed scars of an old trachoma, and the eyeball was normal except for corneal scars.

The Wassermann reaction was negative, and the nasal examination showed nothing of importance.

The patient was taken into the Hospital and the tear sac was removed. A piece of the growth on the tarsus of the left upper lid and the pterygium were excised.

On December 23d, the patient was discharged from the Hospital, and has not been seen since.[1]

Pathological Examination.—The material for examination consists of the entire lacrimal sac, a portion of the conjunctival growth, and the pterygium, with a small amount of bulbar conjunctiva. A piece of the conjunctival growth, transplanted to the denuded conjunctival surface of the lower lid of a Java monkey, healed in position, but was gradually absorbed. The remainder of the conjunctival growth was fixed in absolute alcohol. The lacrimal sac was bisected horizontally, one-half then being fixed in Zenker's fluid and the other in formalin. Part of the latter was prepared by Levaditi's method for spirochætes.

The lacrimal sac is practically intact, 16*mm* x 11*mm* x 8*mm* in size, and is firm and elastic in consistency. On section it is seen that its enlargement is not due to distention of its lumen, but to a relatively enormous thickening of its wall. At some levels it shows three lumina. Elsewhere these are found to unite into one. They have obviously resulted from infoldings of the thickened sac wall. The lumina are collapsed and free from secretion.

Microscopic Examination.—The epithelium of the lumina is normal. The thickening of the sac wall is found to be due chiefly to a marked increase in the adenoid layer, although the connective-tissue layers are also greatly increased in thickness (Fig. 1). The adenoid layer is separated from the epithelium by a thin layer of connective tissue, and consists of a reticulum of connective tissue densely packed almost exclusively with plasma cells. These cells stain typically in thionin, and when stained in phosphotungstic acid hæmatoxylin each shows centrosomes in the clear space contiguous with the nucleus, as in the case of ordinary plasma cells. No distinctly differentiated nucleoli, such as are seen in the cells of multiple myelomata, occur, and no mitotic figures are found. Some of the plasma cells show colloid degeneration and other forms of degeneration commonly seen in chronic inflammatory processes. The most striking feature of the adenoid layer is an abundance of hyaline material within it occurring in small and large irregular masses, the largest being about 1.25*mm* in diameter. The hyaline takes the eosin stain, and stains intensely red by Van Gieson's method. It also stains red in Mallory's connective-tissue stain, which fact is sufficient to differentiate it from amyloid. (The cut surface of the fresh tissue does not give the amyloid reaction with either Lugol's solution or gentian violet.) The masses are none of them definitely calcified, but are evidently hard, as some of them have injured the edge of the microtome knife. Many of the masses are being attacked by foreign-body giant cells.

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[1] Since this was written the patient has been seen again (Feb. 10, 1915). No recurrence has taken place in the region of the lacrimal sac, but the conjunctival growth in the left eye has recurred and become still more extensive. Microscopic examination shows the identical process previously found. The conjunctiva of the other eye has also apparently become slightly affected.

The smaller masses of hyaline, as well as some of the comparatively large ones, show definite relation to the blood-vessels (Fig. 2). They evidently represent arteries and capillaries which have become completely converted into hyaline, for all stages in the transformation can be seen. The arteries, both within the connective-tissue wall of the sac and within the adenoid layer, show extreme endarteritis, frequently with complete obliteration of the lumina. In fact, almost no normal arteries can be seen anywhere. The endarteritis is not always associated with the hyaline change, but the hyaline change is always associated with endarteritis of the affected vessel.

By a special method of staining, it is found that the hyaline is derived chiefly, if not solely, from elastic tissue. This fact is not evident after the usual methods of staining because the elastic tissue has lost its specific staining reactions. Thus, Verhoeff's elastic-tissue stain, as well as acid orcein, fail to stain any elastic tissue in the specimen even including that of the blood-vessels, except at the periphery of the capsule where the tissue is relatively normal. Here elastic fibers can be seen extending inward, but they quickly lose their distinctive color and take the eosin stain. By the following method, however, this altered elastic tissue is stained intensely and an unsuspected abundance of it revealed throughout the specimen. This method does not stain normal elastic tissue, but does stain elacin and other altered elastic tissue which stains slightly or not at all by the ordinary differential methods: Mallory's phosphotungstic acid hæmatoxylin 24 hours. Water. 1% aqueous solution of potassium permanganate a few seconds. Water. 3% solution of oxalic acid until color of the permanganate is removed. In this way the altered elastic tissue and hyaline are stained deep blue-black, while all other tissue elements are decolorized. A beautiful contrast stain may be obtained by staining the sections in eosin before placing them in the hæmatoxylin solution. For this method Zenker's fixation is necessary.

In the case of the blood-vessels, it is found by this method that there is first great increase in the elastic tissue within and around the media. The elastic fibers then become thickened and fuse together, ultimately forming a more or less solid ring around the original lumen. At the same time, the intima has proliferated and finally obliterated the lumen. In some instances, this proliferated intima remains as a central core of hyaline connective tissue which is differentiated from the surrounding hyaline by its staining reactions. In other instances the intimal tissue also becomes pervaded by elastic fibers which undergo hyaline transformation so that the vessel is completely converted into a hyaline column. In the case of very small vessels and capillaries, the same process takes place and the lumina of these also become obliterated. As a preliminary to it, elastic tissue is formed around capillaries and small vessels which normally are without such coats.

The largest masses of hyaline do not represent transformation of blood-vessels, but nevertheless arise from elastic tissue. Some of the latter is evidently derived from the elastic tissue of the adventitia of large vessels that has proliferated into the surrounding tissue. Much of it, however, has extended into the adenoid layer from the connective-tissue capsule of the sac in which there is an enormous development of coarse, elastic fibers (Fig. 3). Within the adenoid layer the elastic tissue forms an irregular reticulum which shows all transitions from a very delicate to a very coarse structure, and shows transformation into hyaline in the same way as the elastic tissue of the arteries (Fig. 4). The Levaditi specimens show no spirochætes or other organisms in the tissue.

Conjunctival Growth.—The specimen removed from the palpebral conjunctiva shows the same pathological condition as the lacrimal sac; that is, marked increase in thickness of the adenoid layer due to infiltration with plasma cells, and large masses of hyaline. The latter are likewise derived from elastic tissue, the transition stages in its formation being easily made out as in the case of the lacrimal sac. After alcohol fixation, the hyaline stains blue in thionin, while the elastic tissue stains in eosin.

The piece of bulbar conjunctiva removed along with the pterygium is markedly infiltrated with plasma cells, but shows no hyaline. The pterygium itself is not infiltrated and shows nothing remarkable.

The pathological process present in this case is undoubtedly identical with that described in the literature as hyaline or amyloid degeneration of the conjunctiva, or plasmoma of the conjunctiva. The case, however, differs from all others reported in that the lacrimal sac was also involved—in fact, much more extensively than the conjunctiva.

In 1891, Unna (1) described the elements which he called plasma cells, believing them to correspond with certain granular connective-tissue cells to which Waldeyer had previously given the same name. These cells are now held to be closely related to lymphocytes. Unna directed attention to tumor-like collections of these cells, which he called plasmoma. His first observations were made in a case of lupus. In more recent times the same name has been given to similar tumors occurring in different parts of the body; notably, the Sinus Morgagni, uvula, gums, larynx, lung, and digestive tract. The term "plasmacytoma," which has also been used for these tumors, would seem to be preferable.

Pascheff (2) was the first to describe a plasmoma of the ocular structures as such, and published 4 of the 9 cases in which the eyeball or its appendages have been involved up to the present time. The writers' case is the 10th. The other cases are those of Rund (3), Deutschmann (4), Rados (5) [two], and Pokrowsky (6).

It is evident, however, that this condition does not form a pathological entity, but simply represents an early stage of the disease, known to previous writers as hyaline and amyloid degeneration of the conjunctiva, of which some 90 cases appear in the literature. The degenerated masses sometimes give the staining reactions of amyloid, sometimes of hyaline only, and sometimes the reactions are indefinite, so that it is impossible to draw any sharp distinction between the two types of degeneration.

Clinically, plasmoma cannot be distinguished from amyloid or hyaline degeneration; but Pascheff would distinguish it pathologically by the extraordinary development of plasma cells in the former case, and from the fact that there is little or no degeneration of the connective-tissue cells.

Former writers—Raehlmann (7), Kubli (8), Kamocki (9), and Rumschewitsch (10)— in describing hyaline and amyloid degeneration, found adenoid hypertrophy in the early stages of the disease. In later times, this adenoid hypertrophy was recognized to be infiltration with plasma cells [Schieck (11), Del Monte (12)].

According to the preponderance of the cellular elements, or of the degenerative material, the condition has been termed plasmoma or hyaline (amyloid) degeneration.

It should again be emphasized that the pathological picture varies extraordinarily according to the stage in which the growth is removed. In one case it will be found to be composed almost entirely of plasma cells with little or no degeneration. In most cases, however, this early stage is soon followed by the deposition of large quantities of hyaline or amyloid so that the picture becomes a very different one.

The question of the origin of the degenerative material is not without interest, and has led to a number of different views. Von Recklinghausen (13), Raehlmann, and others believed that the degenerative products arise from the tissue cells; Leber (14), that the amyloid comes from the tissue cells and especially from the giant cells.

Saemisch (15), however, agrees in the view first expressed by von Hippel (16); namely, that the cells play only a passive rôle, and that the degeneration occurs in the vessel walls and in the intracellular tissue. This view is supported by Vossius (17), Rumschewitsch (10), and Kamocki (9).

According to Parsons (18), degenerative changes lead to the formation of homogeneous material, and in all probability these products come from exudates or secretions—that is, from the non-living products of living cells.

Ishihara (24) is of the opinion that we must assume at least two sources of origin. "The amyloid developed principally from plasma cells seems to be peculiar only to those tumors which are local, while the amyloid arising from the reticulum can form not only local tumors but also general amyloid degeneration."

It should be emphasized that amyloid and hyaline degeneration of the conjunctiva represents a purely local condition, and is not associated with the well-known, general amyloid degeneration of wasting diseases.

From the evidence presented in the pathological examination of the case described by the writers, it is believed that hyaline material is derived from the elastic tissue, and that this transformation may be analogous to that which takes place in pinguecula or pterygium, in which there is also excessive proliferation of elastic tissue with degeneration into hyaline. That plasma cells are not directly concerned in the formation of the hyaline, is shown by the fact that the various stages of its transformation from elastic tissue could be observed in the media of large vessels in which there were no plasma cells.

References to hyaline and amyloid degeneration of the conjunctiva in the English and American literature comprise only two articles, those of Knapp, Alleman (19), and Herbert (20), and no case of plasmoma is to be found up to the present time.

Of the nine cases of ocular plasmoma which are on record, the conjunctiva of the lids and bulb was involved in eight; while in one, the cornea was the main seat of the growth. In one case, there was also an unmistakable hyaline degeneration of the lacrimal gland.

The only further reference to hyaline degeneration of the lacrimal apparatus is to be found in a monograph by Marongiu (21) on *Trachoma of the Tear Passages.* In certain instances many plasma cells were noted under the epithelium in the papillæ in the neighborhood of the vessels. These cells degenerate and give rise to Russell's bodies. This, however, is apparently only the hyaline degeneration seen in trachoma or in any chronic inflammation, and is evidently not to be confounded with the massive degeneration with which we are concerned in this paper.

A more extended reference to the cases of plasmoma which have already been described will be found at the end of the paper.

The clinical picture of the conjunctival disease is uniform, varying only in details, and as Deutschmann well states, the same picture is common to the three conditions—plasmoma, hyaline degeneration, and amyloid degeneration. The process begins with a painless and non-inflammatory enlargement of the lids, more often in the upper. As this increase in size takes place, the lid stands out more and more from the eyeball and droops more and more until the edge may overhang that of the lower lid. The skin of the lids is usually unchanged in character, but rarely shows a brownish pigmentation toward the lid margin. Eversion of the lid shows the enlargement to be due to an enormous thickening of the conjunctiva, most often in the fornix, and in this region may be seen long, sausage-like tumors forming folds and coxcomb-like excrescences. Or the growth may affect the tarsal conjunctiva, the bulbar conjunctiva, the semilunar fold, the caruncle; rarely, as in Pascheff's case, the cornea, and in the writers' case, the lacrimal sac.

The surface of the conjunctiva is ordinarily smooth, and varies in color, according to the stage of the growth, from a bright red to a pale yellowish-gray or even like wax. Occasionally, the surface may be mottled with bright yellowish areas intermixed with the red.

The firmness of the structure varies according to the amount of degeneration. It may bleed readily on manipulation, or if degeneration is far advanced it may show a noticeable avascular character. Both lids are often affected, and both eyes in perhaps one-third of the cases. The disease is found most often in the third decade, but the variations are wide.

Trachoma coexists in perhaps one-third of the cases of plasmoma, hyaline and amyloid degeneration; but, in the opinion of the best authorities, there is no direct relationship between the two.

From the standpoint of differential diagnosis, it should be remembered that a coexisting trachoma may so distort the clinical picture as to make its recognition somewhat difficult. Furthermore, as Saemisch notes, certain tumors—notably, leucosarcoma of the conjunctiva and symmetrical lymphomata of the orbits—might be mistaken for this disease. In any case, microscopic examination of an excised piece of the growth should make the diagnosis clear.

The prognosis is, on the whole, good. The process is a very slow one, and may often be checked by excision. In those cases where the growth is too extensive for total removal, a partial excision has led to the spontaneous disappearance of the remainder. Recurrences are frequent, so that a number of operations may be necessary.

In regard to plasmoma of the lacrimal sac, the clinical diagnosis, judging by the writers' case, should not be impossible. The great thickening of the sac, its waxy consistency, and its lack of cystic distention would seem to be sufficiently distinctive. If in addition there was, as in the writers' case, plasmoma of the conjunctiva, the diagnosis could be considered certain.

Is this new growth to be reckoned among the chronic inflammations, or does it really represent a true tumor? On this point opinion is divided. Pascheff inclines toward the view that we are dealing with a chronic inflammatory process, and in support of this cites the presence of polynuclear leucocytes, especially in the second case which he described, and the inflammatory condition of the conjunctiva in three of his cases, and of the cornea in two (Pascheff's first article, p. 123).

Boit (22), who described a plasmacytoma of the Sinus Morgagni, inclined to the view that it was a true tumor, and in support cited the uniformity of the cell picture, the richness in cells, the multiplicity of the nuclei and the partial degeneration. On the other hand, Pironne (23), who described a similar growth arising from the gums, was in favor of a chronic inflammatory origin.

Rund believes Pascheff's classification to be incorrect, since inflammatory changes are not unknown in the neighborhood of true tumors. Polymorphonuclear leucocytes were only present in small numbers and in areas of degeneration, a feature also common to true new growths. Sections in Rund's case showed in many places the structural picture of a sarcoma, with the exception that the elements were plasma cells. A careful examination of the relation of the tumor masses to the immediately underlying tissue led him also to the same conclusion. He places his case in the group of aleukemic heteroplastic lymphomata.

Deutschmann found in his case nothing that spoke for a chronic inflammatory origin. The leucocytes in the epithelial involutions he took to represent conjunctival secretion. There was no hypertrophy of the subconjunctival tissue, and therefore the growth represented a true tumor, best described by the term plasmoma.

Rados, though confronted by the same clinical and pathological findings, interprets them to be of a chronic inflammatory origin.

In the writers' opinion, the evidence at hand points to an inflammatory origin for the condition. The clinical fact that it has occurred frequently in conjunctivæ showing evidences of existing or previous trachoma points in this direction. It seems to the writers that trachoma is far too infrequent for its coexistence in one-third of the cases of plasmoma to be mere coincidence despite the evidence to the contrary previously quoted. Moreover, infiltrations consisting almost exclusively of plasma cells are characteristic of chronic inflammatory processes of slight intensity, notably late syphilitic lesions. As another illustration of this fact, brawny scleritis may be mentioned. On the other hand, there is a well defined class of true tumors made up of plasma cells, namely the multiple myelomata. These tumors, however, do not show the hyaline degeneration or the vascular changes seen in the so-called plasmomata, and their cells show definite nucleoli and occasionally mitoses, whereas the cells of plasmomata show neither.

Granting that the plasmoma is an inflammatory growth, the difficulty remains of finding its cause. That it is due to the presence of organisms within the tissue is unlikely from the character of the lesions. Plasma cells, it is true, frequently occur in connection with lesions due to micro-organisms, but they are then usually associated with other cells, most often focal collections of pus cells or endothelial cells. It is conceivable, inasmuch as we know nothing definite of the organism causing trachoma, that the condition may be due to the presence of this germ, although the absence of trachoma follicles in the affected tissues is against this view. A possible explanation, also, is that the condition is due to the slow absorption of a toxin from the conjunctival sac. Such a toxin might result from the diseased condition of the conjunctiva dependent upon the old trachoma or other chronic inflammatory process. Acting over a long period of time it might well induce the plasma-cell infiltration, the excessive production of elastic tissue, and the degeneration of the latter into hyaline. In addition it might act on the blood-vessels, thus causing the marked endarteritis. The apparent localized character of the growths would seem to be somewhat against this hypothesis, but as a matter of fact the condition may not be strictly local since in the present case an excised piece of the bulbar conjunctiva also showed well marked plasma-cell infiltration.

SUMMARY OF PREVIOUSLY REPORTED CASES OF PLASMOMA OF THE CONJUNCTIVA.

Case 1. (Pascheff).—A 28-year-old peasant with no previous eye disease. For three or four years he had noticed a heaviness of the right upper lid. The lid hung so low that it partially covered the lower lid. The margin was thickened. A growth 4*mm* thick covered the tarsus, decreasing toward the fornix. The surface of the conjunctiva was smooth and of a pale red color. The consistency was soft, and it bled freely when cut. No apparent trachoma. The lower lid was injected and slightly thickened. The eyeball was normal. The left eye showed a conjunctivitis. A portion of the growth was excised.

Case 2. (Pascheff).—Peasant, 50 years old. One and one-half years previously the eyes became inflamed. The right eye got well, but the left eye remained red and the upper lid thickened so that he had great trouble in opening the eye.

The right eye showed a chronic trachoma in the cicatricial stage.

The left upper lid was thickened and covered the border of the lower lid. On everting it, a localized hard thickening at the inner half was found, the surface of which was smooth and of a wine-red color. The tarsal conjunctiva of the lower lid showed one localized thickening. In the fornices, especially the upper, appeared a greatly thickened conjunctiva, forming sausage-like tumors, of a deep to a pale red color, and a smooth surface. The upper bulbar conjunctiva was thickened, and folds of it largely covered the cornea. No trachomatous granulations. The surface of the cornea showed slight ulcerations. The thickened conjunctiva was removed by operation.

Case 3. (Pascheff).—A peasant girl, 16 years old, gave a history of ocular inflammation at the age of six and a partial loss of sight. At 14 years of age, a second inflammation took place, and the left eye became blind. Beginning then a tumor developed at the upper border of the right cornea, which in two years largely covered it.

The right upper lid was pushed forward, and its conjunctiva and that of the lower lid showed numerous trachomatous granulations. The upper $\frac{4}{5}$ of the cornea was covered by a large tumor, of well defined outlines, and soft, deep red, smooth irregular surface, bleeding easily. The inner half of the tumor reached a thickness of 6 to 8*mm*. The lower $\frac{1}{5}$ of the cornea was vascularized, so that the iris could not be seen. Vision = light perception.

The left cornea showed an ectatic adherent leucoma, and in the fornices were many trachomatous granulations.

The tumor of the right cornea was removed, and an optical iridectomy performed. The vision then rose to the counting of fingers at 50*cm*.

Case 4. (Pascheff).—Peasant girl, 8 years old, of weak constitution. For 2½ years, eye has been red and watery and the lids stuck in the morning. She was never treated.

The right eye showed a moderate ptosis, and the lid borders were red. The conjunctiva of the lower lid was thickened and of a rosy wine color. The thickening was mostly regular, but showed a few more marked areas. The thickened area stretched from the fornix to somewhat over the lower bulbar conjunctiva to the plica semilunaris. The greatest degree, however, was in the upper fornix, where it formed a fleshy, sausage-like tumor.

In the left eye a similar sausage-like tumor appeared in the lower fornix. The upper fornix was less thickened. There was apparently no trachoma.

Case 5. (Rund).—A 51-year-old male had for seventeen years a tumor of the conjunctiva of the left upper lid. Fifteen years ago it was excised and recurred. Five years ago it was excised again and recurred, so that now there existed a tumor of the size of a hazelnut. The well-outlined tumor sat on the inner part of the conjunctival tarsi of the left upper lid, and seemed to merge into the caruncle. Upward it reached the fornix, and downward it went slightly beyond the lid margin. The lid stood out ½ to ¾*cm* from the eyeball. The tumor was 2½*cm* long by 1*cm* wide, red in color, and rather hard. The surface was fissured, and it bled freely when disturbed. The eyes were otherwise normal. Tumor removed.

Case 6. (F. Deutschmann).—The patient was 21 years old. There was slight watering of the left eye, with swelling of the lower lid for three months. The left upper lid stood out from the eyeball. On everting it, the conjunctiva was found to be swollen to a thickness of 5*mm*. The surface was smooth, without scars and of a yellowish-red color. The thickening could not be moved over the tarsus. It extended to both commissures, but did not involve the fornix. The tumor was removed easily from the tarsus, and measured 20*cm* long, 12*cm* wide, and 5*cm* thick.

Case 7 (Rados).—A 54-year-old woman complained for six years of lacrimation and irritated eyes. The conjunctiva in each eye was injected to a deep red color and showed marked hypertrophy. The conjunctival tarsi showed marked scarring in places. The left fornix was so thickened that one could speak of tumor formation. The tarsus of the left upper lid was about 1 *cm* thick. In the right fornix were coxcomb-like excrescences. Both corneæ showed a thick superficial pannus. The tumor was extirpated.

Case 8 (Rados).—Woman, 48 years old. In the right fold of transition was a somewhat lobulated tumor connected with the tarsus, which had enlarged for 1½ years and pushed the upper lid well forward. It was rather soft and of a bright red color. The conjunctiva and cornea of both eyes were otherwise normal. The tumor was extirpated with the tarsus.

Case 9.—At the December 20, 1911, meeting of the Moscow Ophthalmological Society, Pokrowsky demonstrated a conjunctival plasmoma.

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ACUTE (BACILLUS TULARENSE) CONJUNCTIVITIS.[1]

By Dr. ROBERT SATTLER, Cincinnati, Ohio.

THIS brief description adds another to a rare and hitherto unknown and unclassified ocular lesion for which recent research work [Wherry([1])] enables us to assume a definite bacteriologic origin.

The patient was a woman of strong and robust appearance, 43 years old, born and residing in Ohio County, Indiana. She had been in good general health and this was her first ocular disturbance. Without assignable cause and within a time period of less than twenty-four hours preceding her visit to me, her left eye became irritable, attended by excessive weeping. Aside from a steadily increasing feeling of stiffness and burning of the eyelids, due to the œdema, there was no pain. At the same time she was nervous and excitable, and, contrary to her wont, she became loquacious, restless, and at times mildly delirious and complained of hot flashes preceded by rigors, intense thirst, and transitory neuritic (?) pains in her left thigh and leg. She also noticed from the very first a marked swelling occupying the front of the left ear, which was very tender and which rapidly extended to the left side of the lower jaw and neck.

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[1] In certain sections of Ohio, Kentucky, and Indiana, along the Ohio River, rabbits and other rodents are known to have died from a supposed plague-like disease, strongly pointing to a similar infectious lesion, discovered and described by McCoy and Chapin, among the ground squirrels in Tulare County, Cal.

The patient admitted having, with other members of her family, partaken of rabbit meat which she had prepared for the table. The animals were shot or killed in the vicinity of her home. She also admitted that walking with her dog on her own farm, the latter killed and ate a rabbit which showed signs of feebleness. She did not handle this rabbit and no ill consequences attended the killing and eating of the rabbit by the dog.

How the ocular contagion or infection occurred in this case remains a speculative assumption only.

Her physician, Dr. Hall, recognized at once from the acute onset and the uncommon constitutional disturbances the grave character of the ocular lesion and without delay sought counsel.

We found her left eye alone affected. The œdema of the upper lid was tense and glossy, but eversion of the lid was possible and afforded us a complete and careful inspection of the conjunctiva. The bulbar division was slightly chemotic, that of the lid and fornix swollen and dusky in appearance and traversed by thin, translucent, corrugated, sausage-like tubes or lines. The cornea was clear and its epithelium smooth. There was no implication of the uveal tract. Irregularly scattered in the dusky and swollen conjunctiva of the upper and lower lids and fornices, we discovered seven distinct points of infiltration about the size of a split pea resembling pustules which had ruptured and had been converted into shallow ulcers. Each infiltration area was distinctly circumscribed by a grayish-white line and a less saturated base. Four were in the upper lid and three in the mucous lining of the lower lid; two were well concealed in the dense and swollen folds of the upper and lower fornix. None were discovered on the ocular or bulbar conjunctiva. The discharge was watery and straw-colored, with a profuse admixture of stringy and rapidly desiccating mucus if it became entangled or adhered to the shafts of the eyelashes or accumulated at the inner and outer canthus. We could discover no ecchymoses, nor rigid infiltration or longitudinal folding of the palpebral conjunctiva. The local appearance here suggested an intense and increasing œdema, both on the part of the lid and bulbar conjunctiva, accompanied by a marked venous and, in particular, a lymph stasis. She answered incoherently and complained of pain principally in the swollen region in front of the left ear, face, and neck. Temperature 104°.

The following day the constitutional symptoms were intensified. The eyelids were tense and glossy. In appearance the face and neck resembled and strongly suggested acute erysipelas as excessive prostration, profuse perspiration, continued high temperature, and delirium were present. More searching palpation led to the discovery that in addition to the diffuse and clearly outlined cutaneous swelling there was a glandular enlargement with its most marked expression in one of the preauricular glands, from which larger and smaller ones could be traced to the submaxillary and neck region and also to similarly indurated lymph nodes along the inferior margin of the orbit, to the inner canthus.

Repeated attempts to discover organisms in smears, from scrapings of the conjunctiva and the discharge, were unsuccessful. The œdema of the eyelids prevented a close or searching inspection of the eye; the discharge was not profuse and at no time subsequently distinctly purulent, but a constant although moderate flow of straw-colored watery mucus persisted. The right eye was inspected, found apparently intact, and hermetically sealed. For a period of five weeks amidst constitutional symptoms, which alone suggested septic infection,—persistent high and fluctuating temperature; excessive prostration; profuse sweating; recurring chills; delirium; attended by increase and diminution of the glandular swellings of the left side of the face and eyelids continued. The swelling of the neck at times assumed such proportions that interference of respiration was added. She made a slow recovery with complete subsidence of constitutional disturbances. The disappearance of the ocular symptoms even preceded the latter and was marked by a return to normal conditions and appearances, except on the part of the ocular conjunctiva. Here a distinct lymph ectasia or caseated node in the course of a dilated and translucent lymph channel persisted, but gave rise to little or no discomfort and no local irritation; but owing to its barley-grain size and yellowish appearance was objectionable because of its unsightliness and the more than probable certainty that the incarcerated infectious material and resident virulent organisms might light up a local or general disturbance. At a supposedly opportune time, with every surgical precaution, this node was excised. Half was transferred by Mr. Lamb to a guinea-pig and the other half utilized for microscopic examination. The truly remarkable happening following this minor surgical intervention was an immediate reënactment of the same local and constitutional symptoms which had so satisfactorily and completely disappeared. On the part of the eye, intense irritability with rapid and excessive œdema of the lids, chemosis of the ocular and swelling of the palpebral conjunctiva without pustular formations, with rapid enlargement and pain of the lymph nodes along the lower orbital margin, and even more marked and painful enlargement of the much-reduced lymphatic nodes of the anterior auricular, face, and neck regions came about. Intense rheumatoid pains in the back, thighs, and ankles and high temperature. We had within twelve hours a return of the complete original clinical picture, with the same though lesser mental depression, milder delirium, but intense prostration. Within a time period of two weeks complete subsidence with restoration of function and appearance of the eye have come about, but with persisting, though diminished, glandular swellings of the regions repeatedly referred to.

In some particulars the present report departs from, in others it adds to, the clinical history and probable etiology of the case reported by Dr. Vail (2), which was subsequently admitted during my service at the Cincinnati Hospital. His case afforded us an opportunity to study, in particular, the declining stage of the ocular œdema and lymph stases and also gave us a better understanding of the circumorbital lymph nodes and their persistent enlargement after the subsidence of the acute œdema and the choking of the lymph channels of the conjunctiva had disappeared. In Dr. Vail's case, at the time the patient entered the ward of the Cincinnati Hospital, three weeks after the acute onset, the most conspicuous symptoms were three shallow infiltrated, almost circular grayish-white spots, two concealed in the depths of the lower fornix, with even a more striking clinical feature, a larger nodular flattened lymph node in addition to those of the pre-auricular submaxillary glands which occupied the region of the tear sac.

To Dr. Wherry and his assistant Mr. Lamb we are certainly much indebted for having established the bacteriologic origin and in this case, to have pointed out to us the organism of a rare ocular lesion, and for having added one more to the small number of eye lesions which have a known and accepted bacteriology.

Bacteriologic findings (W. B. Wherry and B. H. Lamb, Laboratory of Cincinnati Hospital):

On October 9, 1914, some of the secretion from the eye was suspended in 0.85 per cent. sodium chloride solution and injected intraperitoneally into a guinea-pig. This animal died six days later and on dissection showed lesions resembling those by *B. tularense*, *i.e.*, marked congestion of all the internal organs but especially of the spleen and liver, which were riddled with small yellowish-white foci of necrosis. Smears from the spleen and liver stained with aniline Hoffmann's violet showed numerous minute encapsulated coccoids and rods resembling *B. tularense*. Cultures from the spleen were made on + 1 nutrient agar, glucose agar, glycerine agar, and human blood agar, and on coagulated hen's egg yolk. No growth appeared on any media during sixteen days' observation excepting the egg yolk. Here there was, within twenty-four to forty-eight hours, a slimy, sticky growth. On microscopic examination this showed chiefly coccoid bodies along with a number of rods.

Subcultures failed to grow on a variety of ordinary media, but always grew well on coagulated hen's egg yolk.

We may note here that we were able to demonstrate this strain of the virus with greater ease than the first strain. It stained, in tissue smears, rather readily with Loeffler's methylene blue, whereas we were never able to demonstrate the first strain with this dye. However, both these strains take up aniline dyes rather poorly.

A small quantity of the egg-yolk culture obtained from the above guinea-pig was rubbed into a needle prick in the left conjunctiva of a full-grown rabbit. In forty-eight hours the left eye showed marked œdema and a copious purulent discharge which, when stained with Hoffmann's violet, showed minute coccoid bodies and a few rods. The animal died on the fifth day. On dissection, many discrete yellowish-white ulcers were found on both tarsal conjunctivæ, the left cervical glands were enlarged and hard, and the spleen and liver were enlarged, congested, and full of numerous foci of necrosis.

Examination of the small glandular node removed from near the left canthus:

This was removed on November 18th and a few minutes later half of it was ground up with 0.85 per cent. sodium chloride solution and injected intraperitoneally into a guinea-pig. This animal remained alive and well for nearly a month when it was chloroformed and dissected and found normal.

The other half of the gland was fixed and sectioned. Dr. P. G. Woolley reports that microscopically it appears to be a granuloma without giant cells apparently occurring in a lymph gland.

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CONCERNING REMOVAL OF THE EYEBALL.

III.

CILIARY GANGLION ANÆSTHESIA.

By HARRY S. GRADLE, M.D., Chicago.

THE third phase of this subject deals with the anæsthesia necessary for the removal of the eyeball. Formerly general anæsthesia, ether or chloroform, was used exclusively, and to this day, the majority of operators, in this country at least, continue that practice.

After the introduction of cocaine into ophthalmology, various operators enucleated the eyeball under anæsthesia produced by the simple instillation of a 4% solution of the drug into the conjunctival sac. Later, injections of 2% or 4% cocaine were made into or along the four recti muscles, following the usual cocaine instillation. But enucleation under this anæsthetic was very painful.

In 1907, Siegrist (5) published a method of local anæsthesia. After cocaine instillations, he injected cocaine or novocaine with adrenaline along the course of the four recti muscles rather deeply into the orbit. A final injection of a small amount of the fluid was made into the region of the ciliary ganglion. After a wait of about three minutes, he proceeded with the operation. Mende (6) reported 155 cases operated upon in the Siegrist Clinic by this method. Of this number, 119 were painless, 28 slightly painful, and 8 very painful. The eyes that were not irritated seemed less susceptible to the influence of the anæsthetic than were those that were more or less congested. The author spoke of three contraindications to the use of this anæsthesia: (1) in collapsed eyes; (2) in hypersensitive individuals or children; and (3) in ruptured panophthalmitis. Occasionally there followed some vomiting or a slight collapse, probably due to cocaine idiosyncrasy. A somewhat similar method of anæsthesia was published by Seidel (7), as well as by Bruns (8) and Robin (9).

In 1905, Elschnig (1) first advocated anæsthesia of the eyeball by injection of cocaine into the region of the ciliary nerves on their way through Tenon's capsule. This is a true local anæsthesia. The same author in 1908 published the technique of an anæsthesia on the "nerve-block" principle. This consisted in the injection of cocaine into the ciliary ganglion and the III. nerves as they enter the orbit. The anatomical course of the injection was fully shown by Löwenstein (2). The method has been described in this country in an article by Vail (3) and in another by Wyler (4).

This report includes 236 cases of removal of the eyeball for one cause or another as noted in the preceding two articles. Of this number, 146 eyes were enucleated or exenterated under ciliary ganglion anæsthesia, while a general anæsthetic was employed in 90 cases. As a rule, in extremely young or very sensitive individuals, ether or chloroform was given, not only to avoid shock to the patient, but also to spare the operator 125 of the 146 ganglion anæsthetics, or 85.6%, were successful in that the patients experienced but a minimum of pain. Thirteen individuals, comprising 8.9% of the total, complained of moderate pain during the course of the operation, but were able to allow the operator to proceed without interruption. It was necessary to interrupt the course of the operation and deliver a general anæsthetic in only eight cases, or 5.5%.

The indications for the use of ciliary ganglion anæsthesia are very liberal, in that there are only three contraindications. It is scarcely necessary to mention that this technique may be indulged in only when the eyeball is to be enucleated or exenterated. For there is sufficient damage to the optic nerve and other intraorbital tissues during the course of the injection to contraindicate its use when vision is to be preserved. In very young individuals, it is sometimes unavailable because of the natural restlessness of the patient. But I have seen a child of three years lie perfectly quiet without a whimper while the eye was removed under ciliary ganglion anæsthesia alone. A high degree of neurasthenia is frequently a contraindication to its use. Intraocular tumor, even when a fairly high degree of vision still remains, is not a contraindication to local anæsthesia. It has been claimed that an intense mental shock will result from the sudden loss of vision, but among the cases reported herein were ten such operations without more than the usual shock. Furthermore, such eyes are far better enucleated under local anæsthesia, thereby preventing the possibility of operating upon the sound eye. Such an occurrence has been recorded [Czermak–Elschnig (10)]. It is safer to use other anæsthetics in ruptured panophthalmitis, because of the danger of driving infectious material farther into the orbit. In all other conditions, the local anæsthetic is far preferable to the general.

As the technique is not generally known in this country, a short description will not be out of place. After complete anæsthesia of the conjunctiva by instillations of cocaine, the needle, exactly 5*cm* in length, is introduced underneath the conjunctiva at the outer canthus slightly above the median line along the upper border of the external rectus. It lies horizontally and is directed backward so that a backward prolongation of the needle would form an angle of about 20° with the anteroposterior axis of the eye. This direction is maintained until the equator of the bulb has been passed. During the entire procedure, a small amount of fluid should be injected in advance of the needle in order to lessen the pain and also to anæsthetize the optic nerve sheaths by pressure. The needle is then turned sharply inward, still in the same plane, forming an angle with the backward prolongation of the anteroposterior axis of about 40°. From here on there is no change in the direction of the needle and it is pushed into the orbit until the tip touches the inner orbital wall, above the optic nerve. The hilt of the needle should be almost in contact with the conjunctiva and then the tip is in the neighborhood of the ciliary ganglion. It is obviously impossible to strike the ganglion itself as this is only about one millimeter in diameter. Consequently, the injection (from 1–2*cc*) is made into the region of the ganglion.

The best fluid for injection has proven to be a 1% solution of novocaine to which a small amount of adrenaline has been added. *2cc* of this mixture should be injected, in the case of the ordinary adult. This large amount of fluid serves a double purpose. Not only is the actual fluid more apt to come into contact with the ganglion, should this lie in an anomalous position, but a moderate degree of pressure, or œdema, anæsthesia results from the excessive injection. Cocaine cannot be used in such quantities because of its more toxic character.

About five minutes must be allowed to elapse before beginning the operation. During this time, an injection of cocaine or novocaine should be made under the conjunctiva covering the lower third of the bulb. This area is not associated with the ciliary ganglion, but is under the influence of the middle branches of the trifacial nerve and hence requires a separate anæsthesia. If a proper infiltration of the ganglion region has been secured and sufficient time allowed to elapse before beginning, the operation should be entirely painless. At times a momentary pain is felt by the patient, however, upon section of the optic nerve. This is probably due to the sensory fibers in the dura mater alone. Never have I been able to elicit a sensation of light, even in highly intelligent patients, although some have complained of a feeling as though "struck on the back of the head." It is advisable in old patients or those of an excitable nature to precede the operation by an injection of morphine or pantopon.

In 13 of the 146 cases, the anæsthesia was only fair, while in 8 the anæsthetic was a failure and general narcosis had to be resorted to. Under the class of fair anæsthetics were: Ablatio Retinæ, 1; Leucoma Adherens, 1; Tumor Choroideæ, 3; Vulnus Perforans, 4; Iridocyclitis Infecta, 2; and Ulcus Corneæ, 2. The latter class was comprised of: Vulnus Perforans; Iridocyclitis; Glaucoma Absolutum; and Atrophia Dolorosa. In other words, moderately inflamed eyes or eyes suffering from a non-inflammatory condition do not seem to respond to ganglion anæsthesia as perfectly as do highly inflamed bulbs. In two cases, there occurred a moderate protrusion of the eyeball, but the anæsthesia was perfect and the operation was not interfered with by the condition.

In conclusion, it might not be amiss to repeat the results of the study of these 236 cases.

I. Evisceration may be performed in all cases except those of *malignant growth and phthisis bulbi, provided care be taken that no choroidal remnants remain adherent to the scleral capsule. On the other hand, enucleation may be performed in all cases with the possible exception of very virulent panophthalmitis. From an economic standpoint, enucleation is to be preferred, when possible; but from a cosmetic viewpoint, evisceration is the operation of choice.*

II. It is advisable to endeavor to implant human fat into Tenon's capsule or into the scleral capsule in every case of removal of the eyeball by enucleation or evisceration, except in the presence of acute infection of the coats of the eye.

III. Anæsthesia of the eyeball for purposes of removal is best obtained by injection into the neighborhood of the ciliary ganglion. It forms a safe anæsthetic that does not interfere with the operator. It is without danger to the patients and is contraindicated only in those individuals liable to intense mental shock.

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CHANGES IN THE BLOOD AND AQUEOUS HUMOR IN METHYL ALCOHOL INHALATION.[1]

By Dr. H. H. TYSON and Dr. M. J. SCHOENBERG, New York.

NOTWITHSTANDING the earnest efforts of the ophthalmologists, and the various committees for the prevention of blindness, to disseminate the knowledge of the poisonous qualities and effects of methyl alcohol, it is still a lamentable fact that many members of the medical and legal professions and the vast majority of the laymen, especially the workers using it, are either ignorant of or do not acknowledge the truth. The effect on the eyes and general health from drinking wood alcohol has been proven experimentally in animals, and has been corroborated in clinical practice; but the effect from its inhalation alone on the eyes has never heretofore been demonstrated experimentally.

Although much clinical data has been collected tending to show an effect similar to the one obtained from its imbibition, many doubt and some dispute its power to affect the human organism deleteriously through inhalation alone. The wish to prove this fact, coupled with a desire in the interest of humanity to lessen the number of the blind and to conserve life, induced us to undertake these experiments.

Without giving them in detail, it may be of interest briefly to refer to the importance of the subject to the body politic.

We have found that there have been about one hundred cases of amblyopia and death from inhalation of wood alcohol recorded in the literature to 1912, and we are of the opinion that this constitutes a very small percentage of the total number of cases which have actually occurred, as a great many either have not been recorded, or have gone unrecognized. Of those that have appeared in the literature, the question whether inhalation alone produced the condition has usually arisen. In conducting our investigations, we have endeavored to exclude all possibility of the entrance of the wood alcohol into the system except by inhalation, and we feel sure that we have succeeded in producing amblyopia and death in that manner, as we contemplated at the beginning of these researches.

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[1] Read before the Section on Ophthalmology of the New York Academy of Medicine, May, 1914.

In 1880 about 400,000 gallons of wood alcohol were manufactured, while in 1910 the amount had increased to over 8,000,000 gallons; consequently it appears that the industry has become firmly established. That being true, it is for the chemists and medical profession so to arrange for its use or composition that, while it may serve its purpose in the arts and industries, it shall not levy too heavy a toll on the artisans, and indirectly on the state by causing blindness or death. Its use is extensive; about 2,500,000 people working in trades are using it in the United States alone, and as the foregoing figures indicate, its use is increasing annually.

According to the 1904 United States Census, the following industries and trades were using wood alcohol:

Painters, glaziers, and varnishers	278,000	workers
Launderers	386,000	"
Boot and shoe makers	208,000	"
Barbers	131,116	"
Printers and lithographers	155,000	"
Wood-workers—piano, furniture, etc.	112,000	"

And about 500,000 workers divided among dye-workers, operators, brass-workers, cabinet-workers, gold and silver workers, harness-makers, hat-makers and tanners, metal-workers, photographers, bookbinders, chemists, etc.

The subject is one of increasing importance on account of the new employers' liability law in New York and other States. At present it is not even mentioned specifically as a hazard, but when the importance of the effect of its inhalation is realized, cognizance of this omission must surely follow.

The manufacturers assert that even admitting that commercial wood alcohol is poisonous, the refined product known as Columbian Spirits is not. We have proved conclusively that the refined spirit is quite as dangerous as the unrefined; and indirectly more likely to destroy vision and life on account of the absence of the disagreeable odor to warn one of its presence.

The apparatus used in our investigations consisted of a wooden box which was 32*cm* wide, 47*cm* long, and 63*cm* deep (high) with an opening on each end about 1*cm* in diameter. In one end a mica valve was very delicately adjusted, allowing air to pass out. At the other end was an attachment for tubing which could be connected with an air-tank, or copper coil, and which acted as an inlet for fresh air. The top, in which were two square glass windows, could be fastened down by eight thumbscrews. The temperature of the air in the box for the experiments averaged about 68° F., while the hygrometric readings indicated an average of about 60 per cent., thus to a certain extent constituting conditions similar to those in which some of the workers with methyl alcohol use it, for example, varnishers in beer vats, etc.

The experiments were made with guinea-pigs, rabbits, dogs, and a monkey and consisted in keeping them in the box previously described or in a bell jar containing a definite quantity of the vapor of commercial or refined methyl alcohol, for various periods of time, watching them during the exposure, and examining them afterward. Some animals were kept in a closed space, others had free ventilation, and still others had forced ventilation by having fresh air pumped into the container. One group of animals were exposed only once for a relatively long period of time (three to six hours). Another group had a number of short exposures not exceeding one to two hours daily. By this plan we endeavored to reproduce every possible condition under which 2,500,000 human beings in the United States are performing their work in various trades, etc., in which methyl alcohol is used. One prolonged exposure to the inhalation of the vapor of the methyl alcohol without free ventilation invariably produced loss of consciousness, loss of pupillary reflex, slight contraction of pupils, marked ocular hypotension, coma, and death. A similar exposure to the inhalation of methyl alcohol vapor with active ventilation produced no such marked effect.

Repeated daily inhalations of the vapor for a limited time produced a reduction in visual acuity, and a marked reduction in general vitality. The injurious effect upon the eyes and general health was proportionate to the amount of methyl alcohol used, the humidity and temperature of the air, and the length of exposure and the species of animal. The last factor being important, the susceptibility increasing with the higher development of the animal species of the group of animals used by us, the monkey proved to have the greatest susceptibility to its deleterious effects.

While the data collected as a result of these investigations embraced the effect produced on all viscera, organs, and fluids of the body, it is our desire in this short paper to briefly summarize our observations upon the effect of the inhalation of the vapor of methyl alcohol upon the blood, and aqueous humor of the eye.

Blood count in dog with acute poisoning by inhalation of methyl alcohol. Before inhalation:

Erythrocytes	5,700,000
Leucocytes	11,800
Hæmoglobin	90 per cent.
Polymorphonucl.	79 " "
Lymphocytes	21 " "

After inhalation (2½ hours):

Erythrocytes	7,800,000
Leucocytes	28,600
Hæmoglobin	100 per cent.
Polymorphonucl.	99 " "
Lymphocytes	1 " "

The foregoing table is self-explanatory, showing an increase in all elements except lymphocytes, which show a decided decrease.

The electro-conductivity of the blood serum as determined by Edelmann's Universal Widerstandsbrücke (see technic, *Centralbl. f. Elektric*, 1887, p. 115) was increased after the inhalation of methyl alcohol vapor, the increase being produced either by a change in the corpuscles, from an increase in the H.-ion content, or from any increase in the inorganic salts. An increase in the H.-ion content will produce an increase in the acidity of the blood and also conduces to an œdema of the tissues. As we found evidence of an acidosis in the blood, and a tendency to œdema of the ocular tissues, we think that the increase in the electro-conductivity was due to an increase in the H.-ion content of the blood. The chemical reaction of the blood serum, using phenolphthalein as an indicator, was found after inhalation of the vapor of methyl alcohol to be acid. The specific gravity and viscosity of the blood were increased while the coagulation time was diminished. As regards viscosity, there appeared to be a very slight difference in the reactions between the commercial and refined wood alcohol, the commercial apparently producing a relatively slightly greater viscosity. The increased viscosity and acidosis we consider play an important rôle in the causation of the symptoms produced by poisoning with methyl alcohol.

The examination of the aqueous at first we found rather difficult, as we attempted to obtain it from recently enucleated eyes and it was invariably mixed with blood. A later procedure whereby we aspirated the aqueous humor with a hypodermic syringe proved satisfactory. The aqueous is normally neutral, using phenolphthalein as an indicator. Tested after an animal had been exposed to the inhalation of the vapor of methyl alcohol, we found its reaction to be acid; and to our surprise relatively more so than the blood serum. But upon investigating the cause therefor it was readily explained by the fact that the serum contains cellular elements which possess the power to counteract and regulate to a marked degree any attempt on the part of a foreign element to change the normal alkalinity of the blood, while the aqueous is poor in cells which possess this power.

The results of our experiments with the titration method agree with the conclusions formed by Gregnolo (*Klin. Monatsbl. f. Augenh.*, 1913, p. 157), who determined after the *ingestion* of methyl alcohol that there was an increase in the concentration of H.-ions in the aqueous and serum, and who stated that these changes go parallel with the morphologic changes in the tissues of the eye. His experiments show, as do ours, that the substances produced in the body by poisoning with methyl alcohol are extremely diffusible and penetrate the eye readily.

We consider methyl alcohol to be a true hæmatotoxic. It has a decided effect upon all tissues, producing degenerations, and under extreme conditions amblyopia or death. In reviewing the results of these experiments attention is directed to the similarity with those obtained through experimental researches and clinical observations in the internal administration of methyl alcohol, thus demonstrating its fatal and profound toxicity irrespective of the method of its entrance into the animal organism.

THE PATHOLOGY OF BELL'S PHENOMENON.

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Asst. at the German University Eye Clinic, Prague.

Translated by Dr. Alfred Braun, New York. From *Arch. f. Augenhlk.*, Vol. LXXV., 1913.

(*With two figures in the text.*)

THE phenomenon described by Bell in peripheral facial palsy, in 1823, and considered as a physiological act, namely, the movement of the eyeball upward and outward, on closing the lids, is to-day well known.

However, on the occurrence of the phenomenon under pathological conditions, we find very little in the literature.

An explanation of this can be found only in the fact that observers forget to note the position of the eyes during closure of the lids.

In the first volume of his *Archives*, A. v. Graefe writes the following about the movements of the eyes during closure of the lids:

"That the eyes roll upward during closure of the lids is a well-known fact, but even this rule seems to have its exceptions. In a boy, who had a lagophthalmos resulting from orbital caries, and in whom, as a result, the position of the cornea could be well observed, I noticed that, although at most times the cornea flew under the upper lid during attempted closure of the eye, occasionally, especially during forcible closure, the opposite movement occurred and the cornea disappeared completely under the lower lid."

Boucheaud noticed a similar occurrence in a case of facial paralysis which was in a regressive stage. But, as at the beginning of the paralysis no notice was taken of the eye-movements, it could not be determined whether the reversal of the phenomenon was present at the beginning of the paralysis, or whether it only came on later. A second case of Boucheaud occurred in a patient with tabetic optic atrophy without facial paralysis.

Coppez found a downward Bell's phenomenon twice in two hundred individuals. He does not state, however, whether they were normal or pathological cases.

A more detailed report on the "perverse" Bell's phenomenon is given by B. Fleischer.

> The case was that of a 24-year-old workingman, who had his eyes injured in a powder explosion. The right eye became blind. From the left eyebrow to the edge of the lid there was a cicatricial band, which caused a shortening of the upper lid, and, on attempting to close the lids, a marked lagophthalmos. As the movements of the eyeball were in no wise disturbed, Bell's phenomenon could be very easily observed.
>
> A plastic operation was performed upon the lid, after which a lagophthalmos of 3*mm* remained. During the healing it was observed that on attempting to close the lids the lower lid was drawn up slightly and the eyeball rolled downward so that the cornea was covered by the lower lid. Two years later, examination showed a trichiasis of the upper lid, a lagophthalmos of 2*mm*, corneal epithelial changes, and vascularization at the upper sclerocorneal margin. Upon slight, as well as upon marked, efforts to close the eyes, the eyeballs moved downward and inward, and on the side of the lagophthalmos the cornea disappeared except for a small segment of the upper margin, which could be seen at the margin of the lower lid. Fleischer states specifically that the narrowing of the palpebral fissure occurred principally through upward movement of the lower lid, also that a swelling occurred in the flap on the upper lid.

In a second case of lagophthalmos with hydrocephalus, Fleischer observed a similar phenomenon. In a work which appeared during the printing of this article, Lauber reports three cases of hydrocephalus and one with aneurysm of the basilar artery and disturbances of the posterior cranial nerves, in which he found a reversal of Bell's phenomenon.

Jacobsohn observed, in a patient with bilateral peripheral facial paralysis of surgical traumatic origin, that on closing the eyes the eyeballs went downward and inward.

In a patient with right-sided peripheral facial palsy due to purulent inflammation in the carotid, Schlesinger found that on closing the lids there were slow swinging movements of the eyeballs in the horizontal plane. The movements of the eyeballs could be observed very well through the thin lids, and through the lagophthalmos in the right eye. The excursions were considerable, and caused the cornea to approach the outer as well as the inner canthus. The same movements occurred also during sleep. When the eyes were open the eyeballs were still. After the facial paralysis cleared up these symptoms disappeared.

In a review of 34 cases of peripheral facial paralysis, Fumarola found the phenomenon 13 times upward and outward, 8 times directly upward, 6 times upward and inward, 5 times immobility of the eyes, once rotation downward and inward, and once directly inward.

The following case occurred under our observation.

Since 1909, the patient, J. A., at that time 8 years of age, has been under treatment at our clinic. The child is tuberculous, and had, at an early age, an extensive caries of the left orbital roof, which healed, leaving a marked cicatricial ectropion of the left upper lid. The lid was at that time so firmly adherent to the rough bone at its temporal extremity that the lid-margin was at that point only 3*mm* distant from the orbital margin. There was, in the lateral $\frac{2}{3}$ of the lid, a marked ectropion, the tarsal conjunctiva and upper fornix forming a large swelling. The conjunctiva showed a coarse papillary hypertrophy.

There was a pannus keratitis in the upper part of the cornea, and maculæ in the center. On attempting to close the lids, the eyeballs went upward, only the lowermost part of the cornea remaining uncovered.

During vacation, a plastic operation was done on the upper lid, a flap being taken from the forehead, but was not successful.

In 1912, the patient again came to the clinic. The condition was about the same as at the first examination, the transplanted skin-flap having markedly contracted. On the upper orbital margin could be felt a broad exostosis. The left eye is *2mm* lower than the right, and distinctly exophthalmic, but its movements are not interfered with, (Fig. 1).

Bell's phenomenon occurred in such a manner that, on closing the lids lightly, both eyes moved downwards, the left cornea being covered by the lower lid except for 2*mm*. There was a lagophthalmos of 6*mm* on the left side. On forcible closure of the lids, both eyes made a slight excursion upwards followed immediately by a downward movement under the lower lids. The lagophthalmos became more marked, the more forcible orbicularis contraction causing the ectropion to extend to the medial extremity of the lid (Fig. 2).

During sleep the eyes were also directed downward.

In the fall of the year 1912, the lid was separated from the bone, the exostosis chiseled away, a wedge-shaped portion of the everted lid excised, and a broad non-pedunculated skin-flap implanted on the anterior surface of the lid (Prof. Elschnig).

The result was satisfactory. After the operation, there occurred a spot on the upper lid, near the margin of the bone, from which tear-drops escaped. It was a fistula of the palpebral tear-gland, which healed after being cauterized with silver nitrate.

Now Bell's phenomenon no longer occurred downward but, in the normal manner, upward.

Although Fleischer, in the course of his observations, saw a reversal of Bell's phenomenon, we had the opportunity, in our case, of seeing a normal Bell's phenomenon change to an inverted one, and, after restoring the lids to normal condition, a return of the Bell's phenomenon to the normal.

In order to understand this remarkable anomaly of Bell's phenomenon in peripheral facial paralysis and cicatricial ectropion, which is contradictory to the rule—in former times Bell's phenomenon was considered a pathological symptom in peripheral facial paralysis—a knowledge of the conditions in central facial paralysis, in which Bell's phenomenon is wanting, is of considerable value.

However the publications of Marguliés and Hering, in which the absence of this phenomenon was first noted, have been scarcely acknowledged in the literature (I have found

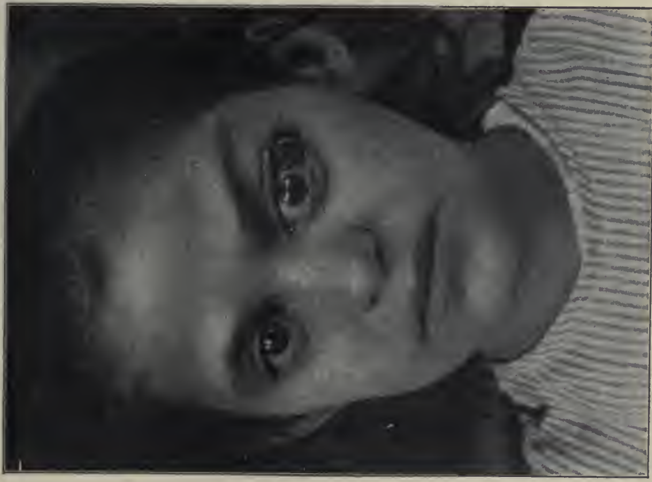

Fig. 1

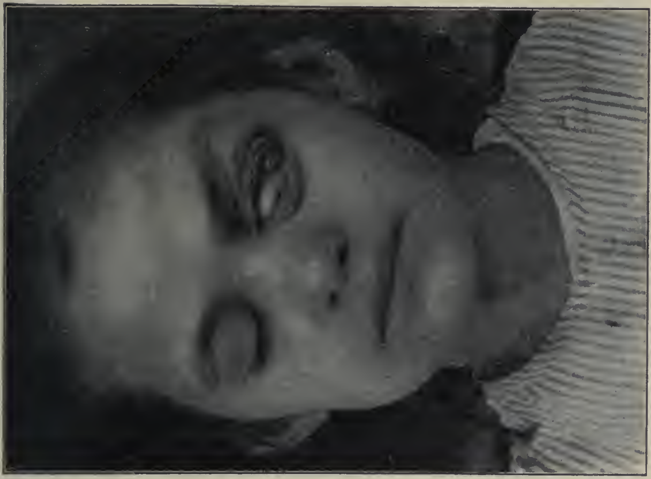

Fig. 2

them cited only by Schlesinger and Elschnig), so that I will take the liberty of going into the matter here.

Marguliés observed two cases with foci in the cerebral cortex. In the first case, there was unilateral, in the second, bilateral facial paralysis. In both cases, Bell's phenomenon was wanting, but in the first case only on the paralyzed side. In this case, the phenomenon returned when the paralysis got well.

A third case of so-called pseudobulbar paralysis was first observed by Hering, and later followed up by Marguliés. Marguliés assumes a bilateral focus in the internal capsule. Here, also, there was absence of Bell's phenomenon with bilateral facial paralysis. Even when, through reflex action, a forcible closure of the lids was effected, there was no movement of the eyeballs.

"On asking her to close the eyes, the upper lids sink slowly for a short distance, so that there is always a certain amount of lagophthalmos. The eyeballs remain immovable, even when she is asked to close the lids forcibly. If an object is rapidly brought before the eyes, the upper lid drops a little lower, but even here a small fissure remains between the lids, and there is no movement of the eyeballs."

Marguliés concludes from this that Bell's phenomenon is an associated movement coming from the cerebrum, whose occurrence seems to be connected with an intact and functionating voluntary impulse for lid-closure, as it disappears with the interruption of the latter and reappears with its restoration.

Hering assumes special corticofugal fibers for the synergic ocular movements, and takes under consideration the possibility that in the cerebral cortex there exists a connection between the cells for the eye and those for the lid movements. The author also draws attention to the fact that similar relations can be assumed in the case of the centripetal trigeminal fibers.

Negro observed involuntary innervation of the facial in a case of partial oculomotor paralysis.

Angela found, on severing the facial experimentally and stimulating the eye muscles by means of an electric current, that Bell's phenomenon occurred. Negro and Angela see here substitution movements, in which the impulse acted upon the intact portion of the reflex tract. There must therefore be an anatomical connection between the nucleus of the facial and that of the oculomotor nerves.

However this explanation can only hold, if we look upon Bell's phenomenon as pathological in peripheral facial palsy, in that the upward movement of the eyes represents the substitution movement for the lid-closure.

The cases of Marguliés and Hering confirm, rather, the assumption of Michel, namely, a functional union between the corresponding cerebral centers.

Without a knowledge of the behavior of Bell's phenomenon in central facial paralysis, W. A. Nagel considers the former to be a reflex act. He assumes that the sensitive cornea seeks that position in which pressure of the lids on the cornea is lightest during closure of the lids. As the movement is most marked during forcible lid-closure, Nagel believes "that the excitation passes from some higher point in the cerebral cortex to the centers of the nerves of the ocular muscles, especially of the elevators of the eye."

This view is also confirmed by the experiments of Polimanti, who never saw absence of the reflex on cocainizing the eye.

Wilbrandt and Saenger hold a similar view.

"The movement of the eyeball upward, on closing the lids, is a very useful associated movement, in that with the reflex closure of the lids to protect the eye, cornea, iris, and lens hide behind the downward-drawn eyebrows, in order to be more safely hidden behind the protection, consisting of contraction of the muscle and thickening of the lid through application."

Fleischer also refutes Mendel's theory of a connection between the nuclei of the facial and of the elevators of the eyeball, because his case could then only be explained by a new-formed connection between the nuclei of the facial and the depressors of the eye. Such a possibility is of course out of the question.

Fleischer sees rather in his observation a support for Nagel's hypothesis. Fleischer assumes a subcortical center whose function it is to coördinate the activities of the oculomotor muscles with the orbicularis, which can adjust itself according to circumstances, and, under unfavorable circumstances, brings about a downward movement. In regard to the cases until then unknown, of v. Graefe and Boucheaud (the cases of Coppez he does not take into consideration on account of the brevity of their report), he leaves it undecided, whether abnormal ocular movements on lid-closure might not have existed here, previously.

We cannot, however, in this way, explain the ocular movements which occur in other directions, as they were described by Schlesinger and Fumarola, as well as why in every case of peripheral facial palsy the phenomenon does not occur in any other direction than upward. We are more prone to accept Hering's hypothesis and to assume connections between the cortical projections of the facial and ocular muscles. The connection between the facial and the elevators of the eye, we must of course look upon as of primitive phylogenetic origin.

Only after long-continued irritation of the cornea do the other tracts come into activity in so far as they are sufficiently well developed.

Thus the abnormal eye positions mentioned by Fumarola occur, or Bell's phenomenon is wanting altogether in peripheral facial palsy, as the above-mentioned author states, although we are somewhat skeptical in this regard, the more so as in central facial paralysis, also, participation of the branch to the brow is possible (Mirallié, Roux, Marguliés, Wilbrandt, and Saenger).

Schlesinger's case points to an irregular irradiation of the innervation, and a complete dissociation of the impulses, in which none of the innervations predominated, as is always observed in sleeping people, where complete dissociation of the eye movements exists and the eyes are not always directed upward and outward, but roll about in slow incoördinated movements.

So our case forms a link in the chain of proofs that in Bell's phenomenon we are dealing with a higher reflex, whose seat is in the cerebral cortex. I would like to mention the fact here, that in the new-born this reflex is wanting, which points to a higher seat than the nuclear region. In the hydrocephalic child with his lagophthalmos, those tracts become active right from the beginning, which bring about a covering of the eyeballs through the under lids, and in this way cause a reversal of Bell's phenomenon, as in the cases of Fleischer and Lauber.

From this it is evident that Bell's phenomenon is of great importance for the localization diagnosis of the neurologist.

From Bielschowsky's researches, it is seen that in certain disturbances of associated eye movements reflex eye movements are possible, while, in passive turning of the head, the position of the eyes is influenced by the vestibular apparatus. In these cases, we must conclude that the nuclear region is intact, and that the lesion is supranuclear.

In a similar way, we can diagnose a supranuclear lesion, if Bell's phenomenon is wanting. The location of the lesion is then usually in the cerebral cortex.

It would therefore be of considerable importance to note how Bell's phenomenon comports itself in associated paralysis, as, to my knowledge, there is nothing to be found on this subject in the literature.

We had the opportunity, a short while ago, to observe three sisters with total external ophthalmoplegia. Bell's phenomenon occurred in a normal manner. We were therefore forced to the conclusion that the nuclei of the ocular muscles were intact, but the tracts connecting the nuclei, especially the posterior longitudinal fasciculus, were congenitally defective, and we assume the disease picture to be one of congenital total ocular paralysis. These cases will be reported in detail in the future.

In conclusion, I wish to thank my honored chief, Prof. Elschnig, for his interest in this communication.

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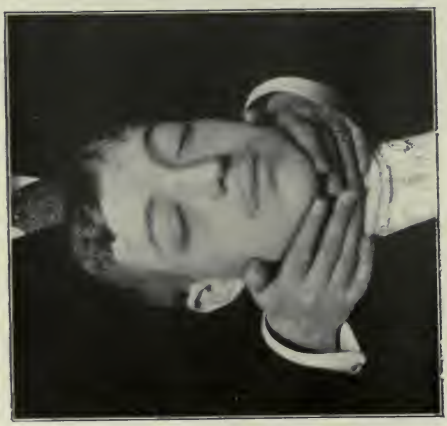
I



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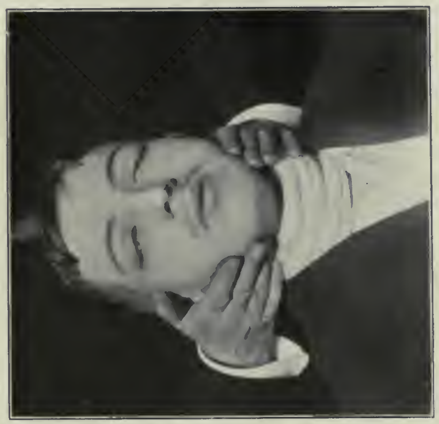

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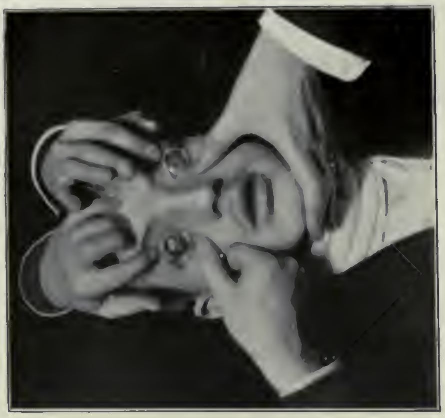

Pincus, Ein Fall von doppelseitiger Tenonitis serosa acuta.

A CASE OF BILATERAL ACUTE SEROUS TENONITIS.

By Dr. F. PINCUS, Cologne.

Translated from the *Arch. f. Augenhl.*, Vol. LXXV., 1913.

(*With three illustrations on appended Plate IX.*)

PRIMARY tenonitis is a very unusual disease. Birch-Hirschfeld, in his careful study of tenonitis, in Graefe-Saemisch, was able to collect 40 cases of serous tenonitis, though he considered some of these to be doubtful as they were complicated with severe optic-nerve lesions. On the other hand, there were other cases which were not primary, such as the two cases observed by Birch-Hirschfeld himself, in which the tenonitis developed after an operation for squint. I thought that a report of an additional case was of interest, especially as I was able to obtain photographs of the condition at its acme, and because the symptoms with which the disease was accompanied in this case have not been previously observed.

On November 8, 1912, I was consulted by a young man in the early twenties, on account of a marked swelling of both eyes. The patient stated that on the night of the 5th of November, after having indulged freely in alcohol, he took a long drive in an open motor and in the evening of the 6th he suddenly was taken with general malaise, fever, pain in the neck, and swelling of the eyelids. On the following day his physician found a slight angina with a temperature of 100° and a swelling with bluish discoloration of the lids of both eyes. This condition increased until the 8th. The patient was otherwise healthy. There were no signs of either gonorrhea or rheumatic affection, and though repeated search was made for evidences of rheumatic diathesis, none were found.

On the morning of November 9th the general condition of the patient was better, temperature slightly elevated, pain in the neck diminished. He complained only of a sense of pressure and pain, which extended from the eye to the rest of the head. The lids of both eyes were dark red and very swollen. There was slight secretion in the eyelashes, which proved to be sterile on examination. It was striking that the swelling and discoloration of the lids were sharply limited to the tarsal part of the lids and did not extend toward the eyebrows nor to the nose, nor externally nor below. It was impossible for the patient to open his eyelids at all. On the other hand, they could be easily opened passively. The lids felt soft, could be everted, and this disclosed a normal conjunctiva. The eyeballs were driven forward and presented an enormous chemotic swelling of the conjunctiva which in places covered the cornea in the form of thick, yellow gelatinous hypertrophies. In the direction of the fornices the conjunctival folds became more red, in part dark red. The patient could not move his eyes and the attempt to do so elicited severe pain. On palpation one received the feeling as if the eyeballs were fast stuck in a hard mass. The cornea, the interior of the eyes, and vision were absolutely normal. The diagnosis of acute serous tenonitis was made and warm compresses and salicylate of soda were prescribed.

On November 10th the patient was free from fever and felt well, but did not show any improvement in his eye symptoms. On the following day he was able to just open the lids. The chemosis seemed less and the first evidences of returning motility of the eyes were observed. The pictures were taken at this time.

In picture I. the patient has been asked to open his eyes as wide as possible. The swelling of the lids is easily seen. In picture II. the head is held back; the characteristic form of the palpebral fissure is to be seen. In picture III. the lids are separated so that the enormous chemosis appears.

On November 12th the condition has still further improved. The lids had resumed their normal contour and were open, except at the extreme outer angle. The eye movements were free, somewhat restricted externally. The conjunctiva was no longer chemotic, though somewhat congested, especially in the outer angle and raising the outer half of the upper lid the accessory lacrimal gland was found to be very much enlarged. The orbital lacrimal gland could not be felt on palpation, though pressure in this position was painful. In the parotid region there was a swelling. The submaxillary and sublingual glands were distinctly enlarged and tender.

I did not again see the patient, but was informed that he recovered fully and resumed his usual occupation.

The diagnosis of this case is simple, as the picture was a typical one. I want particularly to emphasize the peculiar limitation of the discoloration of the swelling of the lids to the tarsal portion of the lids, which symptom is often connected with the name of O'Ferral. Berlin and Birch-Hirschfeld do not place much importance on the value of this symptom, as it does not appear regularly. I must confess that it was exactly this symptom that in this case, which is the first one of its kind that I have seen, suggested a state of congestion starting from the wall of the eyeball. My opinion of tenonitis was then confirmed by the enormous chemosis with the normal eyeball, a marked exophthalmus and complete immobility of the eyeball, together with the great pain produced by attempts to move the eye. Another characteristic feature was the feeling that on palpating the eyeball one received the impression that the eye was packed in a resisting swelling, which seemed to be limited from the rest of the orbit. I do not know whether this symptom has previously been described, and it may not be so pronounced in other cases. It is clear that this palpation was very painful to the patient. These symptoms excluded the retrobulbar affections which were observed in periostitis and diseases of the nasal sinuses. Birch-Hirschfeld described the following triad of symptoms in tenonitis, based upon the anatomic relationship of Tenon's capsule: (I.) moderate exophthalmus; (II.) chemosis; (III.) restricted motility of the eyeball with pain.

The benign course and the great improvement after five days also confirmed the diagnosis and made the character of the tenonitis seem a serous one. A complication of interest was the dacryoadenitis and the inflammation of the salivary glands. The photographs suggest from the typical shape of the palpebral fissure the likelihood of the affection of the lacrimal glands. It is evident that the painfulness in this region was not noticeable while all the tissues surrounding the eyeball were so tender, and the diagnosis of dacryoadenitis could not be made until the tenonitis was improving. It does not seem to me to be likely that the dacryoadenitis was the primary condition which subsequently led by extension to a tenonitis. As far as I know, tenonitis as a complication of a dacryoadenitis is not known, though the latter condition is a relatively frequent one. Furthermore, we have no anatomic reason for believing such an extension. On the other hand, it is possible that the dacryoadenitis became involved indirectly from the tenonitis, possibly from the enormous congestion following the chemosis. This has not been observed in other cases. At the same time, with the severity of the symptoms of tenonitis, the dacryoadenitis may have been overlooked.

The simultaneous affection of all the salivary glands speaks against the connection of the dacryoadenitis with the tenonitis. It is well known that the salivary and lacrimal glands have a certain relation, and they are sometimes all involved, as for instance in mumps or in the so-called Mikulicz disease. It seems probable that in this case a common agent affected these various glands as well as caused the tenonitis. Most cases of primary serous tenonitis are supposed to be due to rheumatism or influenza. There were no signs of either infection in this case. The slight angina may have been the beginning infection in our patient. The frequently observed head cold was surely present in my case, for a ride in an open auto on a windy night, after excessive indulgence in alcohol, would surely furnish sufficient cause for taking cold to convince even the sceptic on the theory of taking cold.

This case is particularly interesting on account of the association of tenonitis with the inflammation of the tear and salivary glands. This association occurred in a case described by Panas.[1] In this case the tenonitis was associated with an exudate into the knee joint and an inflammation of the testicles, and was characterized by frequently recurring attacks in which the right eye was always involved with the right knee and the left testicle, while the left eye became affected together with the left knee and the right testicle. Panas regards the affection of these three organs as an expression of a rheumatic temperament. It is furthermore of interest to remember that in mumps we often find affection of the salivary glands and the testicles.

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[1] *Semaine médicale*, 1897, January 13th. "Tenonitis and Double Orchitis."

REPORT OF THE TRANSACTIONS OF THE SECTION ON OPHTHALMOLOGY OF THE NEW YORK ACADEMY OF MEDICINE.

By GEORGE H. BELL, M.D., Secretary.

H. H. TYSON, M.D., CHAIRMAN. DECEMBER 21, 1914.

Dr. W. B. Weidler presented a patient with **tuberculosis of choroid.** The patient was 26 years of age, with a negative family history. No venereal history, and the Wassermann test was negative. The patient complained of a sudden loss of vision in the right eye, and came to the Manhattan Eye, Ear, and Throat Hospital, November 14, 1914. Vision: O. D., $\frac{20}{100}$; O. S., $\frac{20}{20}$. The right eye showed slight pericorneal injection, posterior corneal deposits, and opacities of the vitreous. The nerve head was indistinct and pale. The veins were swollen and turgid, especially the lower branches. There were several small hemorrhages on the disk. The retina throughout was hazy, and to the nasal side, about two disk diameters from the optic nerve, there was a pale gray area with undefined margins underneath the retinal vessels. Around the edges there were a number of small miliary, tubercle-like deposits. This was seen especially at the lower edge of the area, and above these little miliary spots, which number eight or ten, there was the early deposition of the pigment. Von Pirquet test was positive. A subcutaneous injection of ½*mg* of old tuberculin gave a general, local, and a doubtful focal reaction. The patient has been under treatment with B. E., and the fundus condition is clearing. Vision is now O. D. $\frac{20}{50}$.

Dr. Weidler also presented a case of **congenital fistula of the lacrimal sac.** The patient, aged 24, complains of tears flowing down the side of his nose; a small fistulous opening over the lower portion of the lacrimal sac. Passing probes via the lacrimal puncta and the fistula, the tips of the two probes come in contact near the hilum of the sac. This is the second case of this sort seen by the author.

Discussion: Dr. H. H. TYSON stated that he had presented a case of congenital fistula of the lacrimal sac before the Section about four years ago. The patient was a boy 3 years of age. Using fluorescin in the eye, the stain could be detected both in the nose and by the colored tears discharged through the fistulous opening. He succeeded in closing the same permanently by cauterizing it with the galvano-cautery.

Dr. LINN EMERSON asked what Dr. Weidler proposed to do for the fistula, and advised the use of the galvano-cautery.

Dr. ARNOLD KNAPP presented a case of **pituitary disease with unusual eye symptoms.** The patient, a woman 32 years of age, has always been in good health except that she has suffered from amenorrhea for nine years. There has been a slight increase in weight, and some loss of hair. The eye symptoms consist in a loss of sight observed in the right eye, of one and a half year's standing. This progressed until it became completely lost ten months ago. She has also suffered from headache during this same length of time, principally in the right half of her head. She states that she has had her nose operated upon, but without benefit to her sight or the headache.

The examination of the right eye shows an immobile pupil, an optic atrophy, with the characteristics of a descending atrophy; no perception of light. The left eye is apparently normal in every respect. Even the color field shows no alterations, except possibly an interlacing of the red and blue perception in the nasal half. An examination of the nose shows that the sphenoid has been opened. It is at present clean and dry. The X-ray examination—a stereoscopic photograph of which is passed around—shows a complete destruction of the sellar region. The floor is depressed; both anterior and posterior clinoid processes cannot be recognized. The picture, taken from below upward, gives a shadow corresponding to the region of the sella, extending anteriorly to the right. The case is therefore one of tumor of the pituitary body which has broken through its capsule and involved the right optic nerve.

A few cases of one-sided blindness with non-involvement of the other eye have been reported. I think there are two mentioned by Cushing in his book. Courtellement, in a paper on tumors of the pituitary body ("Les tumeurs du corps pituitaire": Congrès des Aliénistes, 1911), states that the treatment of pituitary lesions consists of three methods: 1st, opotherapy; 2d, radiotherapy; and, 3d, operation.

Opotherapy means the administration of thyroid gland. This he considers of no value. There are, however, some cases published in which the authors believe they have seen a relief of some of the symptoms. Our patient has now been on this for two weeks, without any improvement in her headache. Radiotherapy apparently offers greater prospects of help. There are three reports by Gramenga, Beclère (Soc. de Radiolog. méd. de Paris, Jan. 11, 1910), and Jangeas in which the X-rays have been applied through the mouth, through the nose, and at the temple, with a favorable result in some cases. It is intended to have this treatment carried out in the present case. As for the operative treatment, the unusual location of this tumor, outside of the pituitary fossa, and its extent, would make an operation practically impossible. In any case, it need not be considered until some signs are exhibited in the other eye.

Dr. E. M. ALGER presented a case of **divergence paralysis.** Patient is a widow, 54 years of age, who is said by her family physician to be organically sound. No Wassermann test has been made. Blood pressure is 150. Two months ago she suddenly became conscious of diplopia—objects at a distance only being affected. The diplopia is much less as she gets closer, and she has no diplopia in sewing or reading. The onset, though sudden, was not accompanied by nausea or vertigo. She is myopic (4.50 D.) and has worn glasses for distance only for many years. She has normal vision with each eye, and reads Jaeger No. 1 with either. Ophthalmoscopic examination shows nothing of note. Her pupillary and other reflexes are normal.

Tested with a light at twenty feet, she has a practically homonymous diplopia of 9°, with a barely perceptible right hyperphoria of 1° to 2°. There is no cyclophoria. When the fixation light is carried to the right or to the left, the diplopia does not increase but rather becomes slightly less. The hyperphoria, too, is unchanging. When the fixation object is approached toward her, the diplopia becomes less and less, till at a distance of about eighteen inches vision becomes single and remains single up to three inches from the nasal root, where it becomes a crossed diplopia. When the light is withdrawn, she can maintain single vision to a distance of four feet. Measured by the tropometer, she has an inward rotation in each eye of 45°, and an outward rotation of 40°. With the hyperphoria corrected, her convergence power is only 20°.

My attention was first called to this condition several years ago by a paper of Dr. Duane's, and since that time I have seen some eight cases. The diagnostic points as given by him are: sudden onset, an unchanging homonymous diplopia for distance, which diminishes regularly as the fixation object is approached to the eyes till fusion is established at a rather definite point of equilibrium, within which there is single vision up to a point much nearer the nose than normal. The diplopia diminishes, or at least does not increase, as the fixation object is carried to either side. Single vision "by approximation" is secured at a definite distance, but single vision "by recession" is maintained some little distance further away. The rotations of the eyes in all directions, as measured by the perimeter or tropometer, ought to be normal.

The only conditions with which it is likely to be confused are: (1) paralysis of one or both externi; (2) spasm of convergence; and (3) a primary divergence insufficiency from which it differs only in degree. In the first, the diplopia would increase markedly as the fixation point was carried to one side or both while the lateral rotations of the eyes would be much reduced. The second shows a homonymous diplopia much more marked in accommodation and near at hand than at a distance, and one that is extremely variable and capable of rapid increase by prism exercise. The occurrence of such a condition is one of the arguments in favor of the existence of a definite fusion center, but its site is unknown except that it may be near the origin of the sixth nerve, since one or two cases beginning as divergence paralysis have finally developed a frank externus paralysis. The cause may be vascular (hemorrhage), toxic (diphtheria), or degenerative (tabes), and the prognosis naturally depends on the causative factor.

Discussion: Dr. H. H. TYSON said that he had treated one case of marked divergence paralysis, giving a specific history, with anti-specific remedies, thereby effecting a permanent alleviation of the distressing diplopia.

Dr. FRANCIS VALK did not think this a case of divergence paralysis, but rather one of exophoria.

Dr. G. H. BELL presented a patient who had had a **foreign body removed from the globe.** The man, aged 33, had his left eye injured by a piece of steel from a hammer, on December 2d. The next day he came to Dr. Price's clinic at the Infirmary at which time the vision was $\frac{20}{100}$. There was a central wound of cornea, a hole in the iris on the temporal side near the horizontal meridian. Iris, irregular; pupil, dilated; tension, minus.

The X-ray located the foreign body in the vitreous. The Haab magnet drew the piece of steel into the posterior chamber, and the small magnet was used to pull it into the anterior chamber, from which it was extracted after a small incision was made at the limbus, without an iridectomy. The size of the foreign body was 1.5 x 3*mm.* Fourteen days after extraction, the eye is perfectly quiet; the vitreous, slightly hazy; lens, perfectly clear; tension, normal; pupil, round and central; and vision, with correction, $\frac{20}{20}$.

Dr. L. W. CRIGLER presented a specimen of **dermoid tumor of the eyeball** obtained from a girl aged 13. The mother noticed a small, slightly elevated tumor situated on the left eyeball at the time of birth. She was repeatedly advised that the tumor was harmless as long as left alone.

Recently the tumor began to grow, and the patient came to the Manhattan Eye and Ear Hospital, on August 1st. Examination revealed a pale, white, somewhat elevated tumor, about the dimension and shape of the index finger-nail, situated on the left eyeball, occupying a position involving half the cornea and half of the adjacent conjunctiva, between the insertion of the external and inferior recti muscles. The growth was intimately adherent to both cornea and episcleral tissues. Its surface was somewhat dry and rough, and showed quite a number of stiff straight hairs standing perpendicular to the surface of the tumor, about one-third the length of the ordinary eyelash.

August 12th, under general anæsthesia, the growth was removed by careful dissection. The conjunctiva in the vicinity of the tumor was undermined and drawn over the scleral attachment, leaving only the corneal wound bare of covering; this was swabbed with pure carbolic acid and alcohol, to make sure of a clean surface for corneal epithelial proliferation. In ten days the child was discharged from the hospital, and in three weeks the eye was perfectly quiet, nothing remaining but the scar in the cornea, covering the site of the tumor.

Microscopically the framework of the tumor is connective tissue, in the meshes of which are situated the hair follicles and sebaceous glands. There is a marked absence of blood-vessels and fat globules. The epithelial layer of cells is well defined, being more especially confined to the horny or stratified type.

These tumors should be removed before puberty, to forestall the possibility of growth and consequent impairment of vision. Their removal is easy and safe. This patient's vision was reduced to $\frac{22}{100}$ by the encroachment of the tumor on the pre-pupillary surface of the cornea. Earlier removal might have prevented this.

Dr. C. H. May showed an **electric ophthalmoscope** which presented a number of new features. There was an absence of the usual reflecting mirror, and in place of this a solid rod of glass of which the lower extremity was convex and acted as a converging lens, and the upper posterior portion was ground at an angle of 45° and silvered on the outside so as to serve as a reflector; this arrangement was practically indestructible. The lamp was of small size and was surmounted with a bi-convex lens. The ophthalmoscope was fitted with the double lens disks described by Dr. May in 1900, in which the convex lenses were moved into place by pressure of the finger upon the anterior milled circumference and the concave lenses were similarly manipulated by means of a posterior disk; the lenses followed each other in continuous sequence so that it was unnecessary to apply a quadrant, such as exists in the Loring instrument. Another advantage of this particular form of ophthalmoscope was that the metallic layers were very thin and the sight hole of each was of such a size that it covered every other aperture and its margin presented a beveled and sharp edge which diminished the possibility of annoying reflexes when the blackening of the instrument wore off.

The most important feature of the instrument was the hiding of the film effect of the lamp so that there was a solid and even area of illumination; this contributed greatly to the ease of an examination, whether in the dilated or the undilated pupil. The concentration of light could be altered by raising or lowering the upper part of the instrument, thus separating or approximating the reflecting prism from the lamp. The instrument was equally effective in both the direct and the indirect methods. It could be used with either a battery handle or with cords, and any dry-cell battery could be attached. Finally, it had the advantage of being capable of change from the electric to the ordinary reflecting ophthalmoscope with tilting mirror, in case the lamp burned out or the dry cell became exhausted and there were no renewals on hand. The instrument was manufactured in either the double disk or in the simpler single disk form by the Wappler Electric Light Manufacturing Company, New York.

Dr. WELLS P. EAGLETON showed several cases of **dyspituitarism,** and made a few remarks about them.

REPORT OF THE TRANSACTIONS OF THE SECTION ON OPHTHALMOLOGY OF THE ROYAL SOCIETY OF MEDICINE.

By Mr. C. DEVEREUX MARSHALL, F.R.C.S., London.

The ordinary meeting of the Section was held on Wednesday, 3d of February, under the presidency of Mr. Priestley Smith.

Mr. Bernard Cridland showed a case of **glass-workers' cataract in an iron-smelter (puddler).** He brought the case to give an opportunity for the discussion of the type of case in iron-workers in relation to industrial diseases, as these men were not included in the schedule. Considering the number of hours of exposure to the glare of the molten metal, his surprise was that there were not more cases, especially as these men rarely wore protective goggles. He suggested that a more inclusive term should be applied to the cases of cataract so caused, such as "ray cataract."

Mr. C. B. Goulden said he had a case (a welder) now under care, and he thought an investigation would disclose that the condition was more common among iron-workers than was generally believed. The man who preceded his patient at the work also lost his sight. It was not until quite late that the workers complained, because, owing to the dilatation of the pupil which they had, they were able to see round the cataract.

Dr. Legge, of the Home Office, asked as to the proportion of iron-workers afflicted with this condition, as it was necessary in considering the scheduling of diseases to proceed tentatively. In the case of glass-blowers' cataract there could be no question as to scheduling, as he examined the lenses of 513 glass-blowers, and found cortical cataract in 64 in the right eye, 72 in the left.

Mr. J. H. Parsons said that, as Secretary of a Royal Society

Committee on the subject, he sent many inquiries to ophthalmic surgeons practising in iron-working districts, and the negative replies he mostly obtained led him to the belief that it was the custom of molders to wear tinted glasses. He asked for further evidence for his Committee to continue their investigations.

The President suggested the name "furnace-workers' cataract," seeing that furnace work was common to all.

Dr. COCKAYNE and Dr. ATTLEE showed a case of amaurotic family idiocy, in an English child, not Jewish as was the rule.

Mr. N. BISHOP HARMAN showed a case of spontaneous rupture of cornea in secondary glaucoma caused by dislocation of lens. An injury caused total dislocation of one lens into the posterior chamber, where it was loose. The resulting glaucoma was absolute, and vision was lost. The cornea was anæsthetic, the iris quite retracted and immobile. The condition remained for two years without ulceration of cornea or splitting of Descemet's membrane. Three months later, however, without any further accident, the cornea was split horizontally, and membranes were prolapsed, the cause of the rupture having been a retrochoroidal hemorrhage.

The President (Mr. PRIESTLEY SMITH) showed a form of trench periscope he had just designed. At the top of a narrow shaft, six feet in length, is fixed at an angle of 45° a plane mirror, about 2½ inches in diameter, and an exact counterpart lower down, the distance from the first being adjustable by pegs and holes. Only the top mirror projects above the trench, and this can be largely concealed by a piece of earth. By looking straight into the lower mirror, all movements can be plainly discerned without incurring danger.

Lieutenant-Colonel ELLIOT pointed out how necessary, in order to estimate the distance of the enemy, it was to have the binocular form of periscope.

A paper was contributed by Dr. F. E. BATTEN and Mr. STEPHEN MAYOU on **cerebral degeneration associated with macula changes,** and gave a pathological description of a case. In these cases a curious pigmentation occurred at the macula, and usually also around it, and considerable optic atrophy was also present. Several of the examples of the condition which had been under his care died at Darenth Asylum. He exhibited the pedigrees of two families. In one case the changes in the macula were the last occurrences in the march of degeneration. The brains of these cases did not present any macroscopic abnormality, and they had the usual convolutional pattern, as well as the normal weight and relationship to the cerebellum. The brain and nervous system were examined by several staining methods. There was found to be some degeneration in the medullated fibers; in the cerebellum the myelin was breaking down, and degeneration was present in the cells of Purkinje. The most profound change was in the Betz cells: instead of the Nissl granules, there was a curious accumulation of fine granules around the nucleus. In the cerebellum were large granular cells not normally seen, and he could not say what their significance was. The most marked change was found in the child who had had the disease longest, namely, three and a half years. There were marked changes in the fundus, a shrinking of the convolutions, and in some cases the Betz cells were too degenerated to show the vacuolation. This group was similar to the Waren Tay–Sachs cases of amaurotic family idiocy, but occurring at a later age, and not race-selective. The disease now described was characterized by progressive blindness, progressive paralysis, and progressive dementia, but changes in the macula were not always present.

Mr. MAYOU dealt with the pathology of the eye condition. The child he examined had evidently lost all perception of light, but that was not so in all the cases. Immediately after death the eyes were injected and stained. The changes were confined to the retina, but varied enormously in different parts of the fundus. The principal change was round the macula region. The internal nuclear layers had disappeared altogether, also the rods and cones, and there was some migration of pigment from the retinal pigment cells.

The paper was discussed by Mr. PARSONS and Mr. TREACHER COLLINS, and the authors replied.

QUARTERLY REVIEW OF THE PROGRESS OF OPHTHALMOLOGY.

By H. Koellner, Berlin; W. Krauss, Marburg; R. Kümmell, Erlangen; W. Loehlein, Greifswald; H. Meyer, Brandenburg; W. Nicolai, Berlin; H. Pagenstecher, Strassburg; K. Wessely, Würzburg; and M. Wolfrum, Leipsic, with the Assistance of Drs. Alling, New Haven; Calderaro, Rome; Causé, Mayence; Danis, Brussels; Gilbert, Munich; Groenholm, Helsingfors; v. Poppen, Petrograd; Treutler, Dresden; and Visser, Amsterdam.

Edited by Matthias Lanckton Foster, M.D., F.A.C.S.,
New Rochelle, N. Y.

SECOND QUARTER, 1914—(*Continued*).

XII.—ORBITS, EXOPHTHALMOS, ACCESSORY SINUSES.

85. Alt, Adolf. **An intraocular sarcoma in coexistence with an orbital perithelioma.** *American Journal of Ophthalmology*, May, 1914, p. 131.

86. Ducamp. **Syphilis of the orbit.** *Annales d'oculistique*, cli., p. 477.

87. Friedenwald, Harry. **Giant-cell sarcoma of orbit.** *American Journal of Ophthalmology*, June, 1914.

88. Golowin. **A case of osteoma of the right orbit.** *Zeitsch. f. Augenheil.*, xxxi., p. 549.

89. Gutmann, A. **Studies concerning the orbital displaceability of the eyeball in high degrees of refractive errors and increased intraocular tension.** *Ibid.*, p. 295.

90. Hilfrich, K. J. **Intraorbital complications in acute and chronic affections of the accessory sinuses.** *Zeitschrift f. Ohrenkrankheiten u. Krankheiten d. Luftwege*, lxx., p. 31.

91. Kimble, A. H. **Voluntary displacement of the eye.** *Jour. A. M. A.*, April 4, 1914.

92. Markbreiter, J. **Further studies concerning the changes in the visual field observed in diseases of the nose and accessory sinuses.** *Zeitschrift f. Augenheilkunde*, xxxi., p. 316.

93. Maher, W. Odillo. **Notes on two unusual cases of pulsating exophthalmos.** *Ophthalmology*, April, 1914, and *Ophthalmic Review*, April 1914.

94. Onodi, A. **Ocular, orbital, intracranial, and cerebral complications of nasal origin.** *Medicinische Klinik*, p. 719.

95. Pascheff, C. **Detachment of, and white patches on, the retina in a case of streptococcic orbital abscess.** *Annales d'oculistique*, cli., p. 432.

96. Pascheff, C. **Transitory myopia in orbital cellulitis.** *Ibid.*, p. 426.

97. Ramsay, A. M. **A fungating, bleeding, round-celled sarcoma which originated in the left orbit.** *Ophthalmoscope*, June, 1914, p. 339.

98. Rau. **A case of monolateral optic neuritis caused by chronic suppuration in the maxillary sinus.** *Centralbl. f. prakt Augenheilk.*, March, p. 69.

99. Rollet. **Late results in six cases of removal of cancer of the orbit with preservation of the eye.** Soc. franç. d'ophtalm., May, 1914. *Ann. d'ocul.*, cli., p. 466, and *Archives d'ophtalmologie*, xxxiv., p. 257.

100. Rosenthal. **A case of choked disk in disease of the accessory sinuses.** *Zeitschrift f. Augenheilkunde*, xxxi., p. 549.

101. Sebileau, M. P. **Orbital abscess following a suppurative periodontitis.** *Annales d'oculistique*, cli., p. 241.

Sebileau (101, **Orbital abscess following suppurative periodontitis**) reports three cases of this nature. The extension of the purulent infection took place through the venous system and the bones. There are two ways in which the extension through the veins may take place, superficially through the facial vein which anastomoses with the ophthalmic vein in the inner canthus, and deeply through the anastomoses of the pterygoid plexus with the system of the cavernous sinus. In his first case the eye symptoms were particularly serious: great exophthalmos, eyeball almost immovable, nearly total amaurosis, and changes in the papilla with retinal hemorrhages. The suppuration started from the first premolar, had led to the casting off of a large sequestrum, and to an empyema of the maxillary sinus. The infection must have passed through the deep veins, if through the veins at all, but the absence of signs of meningeal irritation was in that case very remarkable. Hence he thinks that the infection spread through an ascending otitis. Recovery took place after several broad incisions, but with almost complete loss of sight. Sebileau insists that in these cases the prognosis as to vision is always bad, though the eye may regain its normal mobility. The second case, in which the infection came from an incisor, ran a less serious course; there was no disturbance of vision, but a paresis of the inferior oblique developed, which did not entirely disappear on recovery. In the third case, a molar abscess, the eye symptoms were grave, the eye remained amaurotic, and the internal rectus paralyzed.

CAUSÉ.

GUTMANN (89, **Displaceability of the eye in refractive errors**) reports two sets of investigations. In the first he used only eyeballs the tension of which was registered as normal by the tonometer, and found as follows: In high axial myopia the axial displaceability of the globe into the orbit is diminished 0.3 to 0.4*mm* as compared with the emmetropic eye, in consequence of the greater circumference, but in some cases there was a tendency to secure a greater displaceability, and thereby a greater power of movement for quick glances, through an increase of the protrusion from the orbit of 2 or 3*mm*. The enlarged posterior segment thus acquired a capacity for extensive excursions. When the protrusion was over 15*mm*, say 17 to 19*mm*, the eyeball could be displaced approximately the same as an emmetropic one, while with a protrusion of 14 to 15*mm* the average reduction was 0.3*mm*. In high hypermetropia the eyeball could be pressed back considerably more than in emmetropia and in slight hypermetropia. The difference in the indices of high hypermetropia and high myopia are particularly striking. In asymmetry of the two sides of the face the displaceability varies with the protrusion, even though the refraction of the two eyes is the same. The variation is very distinct when there is a great difference in the refraction. The second set of investigations dealt with increase of tension. When the intraocular tension is increased to about 40*mm* of mercury the displaceability into the orbit is diminished 0.3 to 0.4*mm*. After normal tension had been regained by an operation the displaceability was found to be normal also. The author explains this phenomenon as due to the increase in volume of the globe in greatly increased tension, and to the obstruction of the outflow of the blood and lymph.

PASCHEFF (95, **Detachment of, and white patches on, the retina in a case of orbital phlegmon**) saw a girl 12 years old, with an orbital abscess which presented an interesting picture of the fundus, namely, an extensive detachment of the retina below, corresponding to the seat of the abscess and numerous small white patches on the temporal side of the disk and around the macula. Some of the patches were superficial, others quite deep, underneath the retinal vessels. Vision was reduced to perception of light. The intraocular pressure was 50*mm* Hg. The evacuation of the pus was soon followed by a marked reduction of the tension and partially of the detachment. A re-examination of the eye four months later showed the persistence of numerous white shiny patches and yellowish pigmented striæ above, below, and also in the macular region, located in the deeper retinal layers. The retina below seemed to be slightly detached. Vision amounted to counting fingers on the temporal side of the field.

SCHOENBERG.

PASCHEFF (96, **Transitory myopia in orbital cellulitis**) saw a patient with non-suppurative orbital cellulitis and myopia of the right eye. A 3.50 sph. improved the vision from $\frac{6}{20}$ to $\frac{6}{6}$. After the inflammatory condition subsided, the eye became emmetropic and the vision was $\frac{6}{6}$ without a glass.

SCHOENBERG.

ROLLET (99, **Late results of extirpation of cancer of the orbit with preservation of the eyeball**) has recently examined six of his patients operated on for malignant tumors of the orbit, one, two, two, five, six, and eight years ago. The results remained as good as just after the operation. The eyeballs were preserved with perfect mobility and with good vision wherever there was no previous optic atrophy. No recurrence took place, except in one patient. The author insists upon an early operation and expresses his satisfaction with his own method of entering the orbit, which, contrary to Kroenlein's, does not injure the bony walls of the orbit. The method is simple and consists in a curved incision following the margins of the orbit either below and temporally, or above and internally, according to the supposed location of the tumor. Since in most of the incipient cases, the new growth has no adherences with either the bone, or the soft tissues in the orbit, the author always found it easy to quickly shell out the tumor, which is usually situated in the space between the periosteum and the muscular cone.

SCHOENBERG.

Friedenwald (87, **Giant-cell sarcoma of the orbit**) removed a tumor through an incision along the upper orbital margin. The report states that it was a typical giant-cell sarcoma, highly cellular, and pervaded with hemorrhages. It had the cardinal features of a myeloid sarcoma, and no previous record of such a tumor of the orbit has been found.

Alling.

Alt (85, **Intraocular sarcoma coexisting with an orbital perithelioma**) gives the clinical history and histological findings in a case of this nature. He thinks it likely that the orbital tumor, a perithelioma, was the older, and that the intraocular, pigmented angiosarcoma was of more recent date. That is, that in this case two tumors, an orbital one and an intraocular one, grew separately and coexisted until probably the sclera was perforated near the optic-nerve entrance by the intraocular growth and the two tumors were thus joined together.

Foster.

A little growth appeared on the upper-inner margin of the orbit of an elderly man five years after a contusion, and attained in the course of ten years the size of a walnut, forcing the eye downward. It was firmly adherent to the bone. Golowin (88, **Osteoma of the right orbit**) removed two osteomata that came from the frontal sinus. He also found a little osteoma situated deeply in the orbit that came from either the ethmoid or the frontal sinus.

The first case described by Maher (93, **Two unusual cases of pulsating exophthalmos**) developed exophthalmos of the right eye after a severe blow on the head. The eye was enucleated, and three weeks later the left began to protrude and to pulsate. The pulsation and bruit could be stopped by pressure on the right common carotid. Ligation of the right internal carotid resulted in a cure. He thinks that the enucleation of the right eye caused a clot to form in the anterior part of the right arterio-venous aneurysm. Pressure on the right carotid then dilated the circular sinus connecting the two cavernous sinuses, and thus the pressure on the right internal carotid was conveyed to the left cavernous sinus, producing pulsating exophthalmos of the left eye.

The second case, after fracture of the skull, developed left exophthalmos, which gradually subsided, but at the same time the right became proptosed. The pulsation of the right side was controlled by pressure on the left carotid. The left internal carotid was tied and the case recovered. In this case a clot probably formed in the same way, resulting in a spontaneous cure, but the pressure was transmitted to the right side.

ALLING.

KIMBLE (91, **Voluntary displacement of the eye**) records the interesting case of a man thirty years old, who was an inmate of a hospital for the insane, and had acquired the habit of pressing his finger into the orbit below the left eye. Within a few weeks he was able to force the eye out of its socket and through the palpebral fissure. The eye was always more proptosed than the other. The right pupil reacted normally but the left only consensually. The left optic nerve was atrophic, the vessels normal in appearance. The globe was at least an inch from its normal position when extruded.

ALLING.

ROSENTHAL'S (100, **Choked disk in disease of the accessory sinuses**) had symptoms of an empyema of the left ethmoid, with exophthalmos and choked disk of the left eye. These symptoms were relieved at first by operation, but later the left eyeball became still more exophthalmic and a commencing choked disk appeared in the right. Opening of the ethmoid from the orbit revealed a neoplasm which proved to be a spindle-cell sarcoma.

The number of ocular and orbital symptoms that ONODI (94, **Ocular, orbital, intracranial, and cerebral complications of nasal origin**) has observed in cases of disease of the accessory sinuses is remarkable. He emphasizes the enlargement of the blind spot and a central scotoma as important early symptoms of retrobulbar optic neuritis. In many cases it is difficult to determine whether the visual disturbances present are accidentally or etiologically associated. Early recognition of the rhinogenous origin of the visual trouble and quick intervention are essential. A free opening and evacuation of the posterior accessory sinuses is indicated even in slight lesions of the optic nerve.

HILFRICH (90, **Intraorbital complications in affections of the accessory sinuses**) describes the complications he has observed in nine cases. These consisted of swelling of the contents of the orbit, causing protrusion and limitation of movement of the eyeball, diplopia, and headache. The acute onset of an exophthalmos may be sometimes the only external symptom of a disease of an accessory sinus. Such affections of the eye as iridochoroiditis, cataract, and opacities of the vitreous, he considers metastatic. The most dangerous complication is disease of the optic nerve. His cases show that these complications may be made to disappear by timely thorough operative treatment of the cavity affected, but it is not well to direct the procedure solely against the abscess. Incisions in the peribulbar tissue, and even the opening up of some of the ethmoid cells are usually insufficient.

MARKBREITER (92, **Changes in the visual field in diseases of the nose and accessory sinuses**) investigated the visual field in a hundred cases of empyema of the accessory sinuses, excluding all in which the eye showed changes that might cause disturbances in the field of vision. The empyema in 63 of these 100 cases was in the anterior, in 9 in the posterior, and in 3 in all of the accessory sinuses, while in 25 the exact localization was not specified. Of the 63 cases of anterior accessory sinuses 17 were of the frontal sinus, 31 of the maxillary sinus, 3 of the anterior ethmoid cells, and 1 of the anterior ethmoid cells and the frontal sinus. A change was found in 70 of the 100 cases although the fundus was normal and the vision perfect. Such changes were present in 48 of the 63 cases of empyema of the anterior accessory sinuses, and in 7 of the 9 cases in which the trouble was in the posterior. Twenty of the 70 cases were examined later; sixteen had a normal field, the defect persisted in four. The change in 52 of the 70 cases was enlargement of the blind spot, in 7 central scotoma, in 11 peripheral contractions, island or ring scotomata. Enlargement of the blind spot occurs seven times as often as central scotoma. The enlargement of the blind spot was alone in only 28, in nearly half it was associated with other changes. Central scotoma was alone in 6, only once associated with other changes. The enlargement of the blind spot always appeared earlier for colors than for white, and in very many cases these changes in the visual field were present when the vision and the fundus were perfectly normal. The author has never seen enlargement of the blind spot pass later into central scotoma. He finds, therefore, enlargement of the blind spot to be the most common eye symptom of empyema of the accessory sinuses, but it presents no diagnostic features by which it may be determined whether the empyema is in the anterior or the posterior sinuses. He also found changes in the visual field in 11 out of 37 cases of non-suppurative disease of the accessory sinuses, hence they are not only not characteristic of disease of the posterior ones, but also not of empyema.

RAU (98, **Monolateral optic neuritis caused by chronic suppuration in the maxillary sinus**) treated a patient with optic neuritis, vision and field being normal, for a year with injections of mercury, iodide of potassium, and sweating, with a good result. As the neuritis recurred at the end of two years with decrease of vision, with frontal headache and pain on percussion over the frontal sinus, the patient was examined rhinologically and found to have an empyema of the maxillary sinus. Perfect recovery followed surgical intervention. It is noticeable in this case that the empyema of the maxillary sinus caused severe pain in the region of the frontal sinus, while its own region remained free from pain, even on percussion.

RAMSAY (97, **A fungating, bleeding, round-celled sarcoma which originated in the left orbit**) reports a case in a boy of fourteen years of age which followed a blow on the left eye two months previously. The swelling and ecchymosis soon disappeared, but seven weeks afterward he noticed the eye becoming prominent, with lids red and swollen, but no pain. As the tumor grew, the hemorrhages became alarming in frequency and amount. The tumor grew to one and a half pounds in weight, and was a typical round-celled sarcoma.

CURRAN.

XIII.—CONJUNCTIVA.

102. ARMAIGNAC. **A curious case of hereditary pterygium.** *Soc. franç. d'ophtalm.*, May, 1914, *Annales d'oculistique*, cli., p. 469.

103. BOULAI and COLLET. **Parinaud's conjunctivitis.** *La clinique ophtalm.*, xx., p. 348.

104. BROWN, S. H. **Herpes simplex affecting the palpebral and bulbar conjunctiva simulating lues.** *American Jour. of Ophthalmology*, May, 1914.

105. CASALINO. **Clinical and pathological contribution concerning angioma of the conjunctiva.** *Arch. di Ottalm.*, October, 1913, p. 206.

106. FALCHI. **Spotted inflammation of the conjunctiva.** *Ibid.*, 1913, p. 1.

107. Gebb. **Experimental studies concerning the relations between inclusion blennorrhea and trachoma.** *Zeitschrift f. Augenheilkunde*, June, p. 475.

108. Kardo. **Treatment of trachoma with carbonic-acid snow.** *Ibid.*, April–May, p. 450.

109. Leber, A. **Samoan conjunctivitis.** *Arch. f. Ophthalm.*, lxxxvii., p. 528.

110. Leber and Prowazek. **Desquamative epitheliosis of the South Sea.** *Ibid.*, p. 534.

111. Meyerhof. **Is there a natural or acquired immunity to trachoma?** *Revue générale d'ophtalmologie*, xxxiii., p. 145.

112. Peterka. **Treatment of photophobia in eczematous conjunctivitis.** *Muenchener medizinische Wochenschrift*, 1914, p. 1228.

113. Sattler, C. H. **On the action of anæsthetics in subconjunctival injections.** *Archiv f. Ophthalmologie*, lxxxviii., 2, p. 259.

114. Sattler, C. H. **On the action of acoin in subconjunctival injections.** *Ibid.*, p. 277.

115. Tabarisky. **Ætiology of pseudopterygium.** *Zeitschrift f. Augenh.*, April–May, p. 447.

116. Thomson, Ernest. **Iritis associated with the diplobacillus (Morax-Axenfeld).** *Ophthalmoscope*, May, 1914.

Boulai and Collet (103, **Parinaud's conjunctivitis**) observed a case of this disease in a woman 50 years of age. There were no signs of tuberculosis and the bacteriological examination was negative. The disease developed in a typical manner; treatment consisted of hot compresses and astringents and complete recovery took place within two months without any affection of the other eye and without complication. The swelling of the glands also went down.

Causé.

Leber (109, **Samoan conjunctivitis**) has studied in Samoa an endemic form of conjunctivitis, called Samoan, which is due to the diplococcus Samoensis. It begins as a very acute conjunctivitis, sometimes resembling gonorrhea. The preauricular gland is swollen; rhinitis and pharyngitis are present. There is œdema of the upper lid, small hemorrhages appear on the bulbar conjunctiva, and the conjunctiva of the lids and fornix is swollen. The discharge is at first thin, but soon becomes purulent. Sometimes the periphery of the cornea becomes hazy. All of these symptoms disappear under appropriate treatment in nine or ten days, and complete recovery is the rule. Absence of treatment or wrong treatment however may lead to perforating ulceration of the cornea and even to phthisis bulbi.

SCHIRMER.

THOMSON [116, **Iritis associated with the diplobacillus (Morax-Axenfeld)**] reports a case of conjunctivitis due to the Morax-Axenfeld bacillus associated with iritis. He suggests that the iritis was due to the absorption of toxins from the conjunctiva. Both became well under zinc treatment.

CURRAN.

PETERKA (112, **Treatment of photophobia in eczematous conjunctivitis**) recommends methylhydrocuprein for its anæsthetic action in these cases. He reports two particularly obstinate cases which recovered completely after the use of a 5% solution instilled two or three times a day.

MEYERHOF (111, **Immunity to trachoma**) concludes that there is neither racial nor individual immunity to trachoma. One attack of the disease is no guard against another, Serum treatment therefore seems to be hopeless. In some cases there is an interval of several years between the affection of the first and that of the second eye. Among 2828 private patients he found only seven in which the disease was confined to one eye.

CAUSÉ.

TABARISKY (115, **Pseudopterygium**) found typical Halberstaedter-Prowazek bodies in the epithelium of fresh cases of trachomatous pannus, that disappeared as the pannus retrograded. If the pannus continued the bodies became conical or pear-shaped. He considers pseudopterygium a consequence of acute conjunctivitis, and that trachoma of infants must be considered ætiologically.

GEBB (107, **Relations between inclusion blennorrhea and trachoma**) experimentally transferred material for inoculation from an infant with inclusion blennorrhea to several patients. The result confirmed him in the belief that there is no ætiological identity between inclusion blennorrhea and trachoma. The virus produced in adults an infectious disease exactly like, clinically, the inclusion blennorrhea of infants, but no trachoma, or symptoms resembling it, developed even after several years. The temperature of the room, or low temperatures, have no effect upon the vitality of the virus, but it is killed by higher temperatures.

KARDO (108, **Treatment of trachoma with carbonic-acid snow**) has tried this remedy in 92 cases, mostly in the second stage, with good results. The other eye was treated otherwise for comparison. The snow produces a rapid absorption of the follicles, but its effect is confined to the place where it is applied.

Subconjunctival injections produce hyperæmia of the ciliary body and the aqueous secreted becomes richer in albuminates and antibodies. SATTLER (113, **Action of anæsthetics in subconjunctival injections**) has studied by experiments on rabbits the question whether or not the addition of anæsthetics diminishes the effect of the salt injection. The results of a large series of experiments go to show that the effect on the ciliary body is considerably diminished by cocainizing the conjunctiva, or by the addition of cocaine to the fluid injected. The reason is not the contraction of the vessels caused by the cocaine, but the paralysis of the sensitive nerves which interrupts or diminishes the reflex action. Different drugs interfere, to varying degrees, with the effect of the salt solution. The effect is diminished most by cocaine, less by novocain or alypin, not at all by acoin.

SCHIRMER.

SATTLER (114, **Acoin in subconjunctival injections**) has found that a 1% solution of acoin injected beneath the conjunctiva has disagreeable by-effects if given in too large doses. More than 0.2*ccm* produces adhesions between the sclera and the conjunctiva; more than half a cubic centimeter may cause considerable shrinkage of the conjunctival sac and lasting opacities of the cornea. Not more than 0.1*ccm* of a one per cent. solution of acoin should ever be injected.

SCHIRMER.

LEBER and PROWAZEK (110, **Desquamative epitheliosis of the South Sea**) describe the anatomical findings in this disease, which is frequent on the islands of the Pacific Ocean. It resembles inclusion blennorrhea, and its inclusion bodies look very much like those of blennorrhea and trachoma.

SCHIRMER.

BROWN (104, **Herpes simplex affecting the palpebral and bulbar conjunctiva**) saw a young girl with an extreme œdema of the lids and conjunctiva which subsided after a few days, leaving a large vesicle of the conjunctiva of the lower lid. After rupture of the bleb the area was covered with exuberant granulations that lasted about six weeks. Although the appearances resembled those of an initial lesion, the Wassermann test was negative, and the diagnosis of herpes was made. (A negative Wassermann can hardly disprove the possibility of an initial lesion, unless the test is made several weeks after its appearance, as the test cannot be positive until after the infection of syphilis has spread generally throughout the organism. —F.)

ALLING.

FALCHI'S (106, **Spotted inflammation of the conjunctiva**) patient, 22 years old, had a hyperæmic conjunctiva with a burning feeling, photophobia and lacrimation, together with a slight fever following an attack of neuralgia of the second branch of the trigeminus. With the aid of a magnifying glass little, scattered points could be seen which joined into little spots in a few days, and these blended later into white patches of irregular shape having a diameter of from 3 to 7*mm*. These began to retrogress at the end of eight or ten days, gradually became whitish, and disappeared. The rest of the eye and conjunctiva remained normal. Repeated recurrences took place during the next five years, sometimes as many as three in a year. Pathological examination showed changes in the various tissues of the conjunctiva, mainly of a degenerative type. Bacteriological examination revealed the staphylococcus albus. The best treatment seemed to be bandaging the eye, instillation of cocaine and boric-acid solution, with the simultaneous administration of quinine and arsenic.

CALDERARO.

ARMAIGNAC (102, **Hereditary pterygium**) found eight out of twenty-two persons in one family afflicted with pterygium of both eyes; two of them had four pterygia each on the two eyes. He thinks that the cause of this is a hereditary trophic disturbance, like that of nævi.

CAUSÉ.

CASALINO (105, **Angioma of the conjunctiva**) reports three cases. In one the little tumor was situated in the palpebral conjunctiva, in both the others in the bulbar. The writer classifies them among the true angiomata with extensive teleangiectasis of the vessels, which depends on a traumatism to the entire conjunctival tissue. All of the tumors were thoroughly removed.

CALDERARO.

XIV.—CORNEA AND SCLERA.

117. ATTIAS. **Periodic marginal keratitis.** *Arch. di Ottalm.*, Oct., 1913, p. 187.

118. BONNEFON. **Experimental researches on keratoplasty.** *Arch. d'ophtalm.*, xxxiv., p. 193.

119. COCKAYNE. **Hereditary blue sclerotics and brittle bones.** *Ophthalmoscope*, May, 1914.

120. FERONI. **Keratectomy.** *Annal. di Ottalm.*, f. 5–8, p. 490.

121. HASELBERG. **A case of keratoplasty.** *Berl. ophthalm. Ges.*, June 25th.

122. KAZ. **Eserine ointment in the extensive infiltrations of scrofulous keratitis.** *La clinique ophtalm.*, xx., p. 352.

123. KUEMMELL. **Treatment of ulcus serpens.** *Muenchener med. Wochenschrift*, p. 1326.

124. MEISNER. **Metastatic scleral abscess.** *Klin. Monatsbl.* f. *Augenheilk.*, May, 1914, p. 708.

125. PICCALUGA. **Five cases of filamentous keratitis.** *Annali di Ottalm.*, f. 5–8, p. 496.

126. STREBEL. **Gonorrheal keratitis after reinjection of gonococcus vaccine. Metastatic gonorrheal conjunctivitis.** *Muench. med. Wochensch.*, p. 1448.

127. WATANABE. **Pathological condition in parenchymatous keratitis due to congenital syphilis, with special reference to the new growth of connective tissue on the posterior surface of the cornea.** *Klin. Monatsbl. f. Augenheilkunde*, March–April, 1914, p. 408.

The removal of the focus of infection by means of a circular incision in the healthy tissue, passing deeply into the parenchyma of the cornea, but not quite through it, gives good results in suppurative keratitis, according to FERONI (120, **Keratectomy**). The infectious process may be arrested in this way, and a quick cicatrization secured which results in a less dense leucoma.

CALDERARO.

BONNEFON (118, **Experimental researches on keratoplasty**) gives a highly interesting study of the question of transplantation of the cornea. His work consisted of the study of the macroscopical and microscopical changes that take place in pieces of cornea transplanted from one eye to the other: (1) of the same animal (autoplasty); (2) of two animals belonging to the same species (homoplasty); (3) of a guinea-pig to a rabbit (heteroplasty); (4) of a chicken to a rabbit (heteroplasty). A careful consideration of the facts furnished by the experiments in the first three groups, autoplasty, homoplasty, and a certain heteroplasty (guinea-pig-rabbit), leads to the following conclusions: The epithelial layer persists in the transplanted cornea and keeps its traits characteristic to the guinea-pig, as shown by the differences in staining properties and microscopic appearances even months after the transplantation is performed. The fixed cells of the substantia propria of the transplanted piece of cornea become necrotic, disappear, and are replaced by young connective-tissue cells which migrate from the cornea of the host. The heterokeratoplasty performed between chicken and rabbit, however, shows a different evolution, namely, all the cellular elements (the epithelium included) of the transplanted cornea become necrotic; there is no sign of regeneration, and the piece of transplanted cornea disappears by a process of slow absorption; it is replaced by connective tissue and epithelium which originate in the cornea of the host. We have to deal with two corneæ (rabbit and chicken) which are of an entirely different anatomical type and for this reason the transplanted cornea acts like a foreign body and does not take. In the other group of experiments, namely autoplasty, homoplasty, and heteroplasty (guinea-pig-rabbit), the transplanted cornea is assimilable since it belongs to the same anatomical type. According to the author, it cannot be denied that both the cornea of the host and the one transplanted play each an important rôle: the former to furnish the cells for the parenchyma; the latter, the epithelium and also to stimulate and regulate the entire process of regeneration. The author summarizes the teachings of his experiments and their application to keratoplasty in human beings in the following three propositions: (1) The successful transplantation of a cornea depends on both the piece of transplanted cornea and the cornea of the host. (2) Only the experimental keratoplasty fulfills the requirements of an ideal operation: the transplantation of a transparent cornea on a transparent cornea. For this reason, mainly, do such experiments succeed so infrequently. (3) In keratoplasty practiced on human beings, the cornea is transplanted on an opaque cornea, and for this reason the result is a failure. The paper is well illustrated with microphotographs and plates.

SCHOENBERG.

HASELBERG (121, **Keratoplasty**) reports the case of a patient on whom Froelich performed keratoplasty on June 13, 1913, with a remarkably good result. The patient had suffered from childhood from recurrent attacks of keratitis, until finally the cicatrices had completely blinded the eyes so that she could no longer go about alone on the street. He happened to have the opportunity to use a fresh, transparent piece of cornea from a woman 22 years old whose eye had to be enucleated on account of atrophia dolorosa. He first removed with Hippel's trephine a disk 3*mm* broad and ½*mm* thick from the center of the opaque cornea, leaving Descemet's membrane intact. Then in the same way he took a piece of the same size from the cornea of the second patient, without Descemet's membrane, and used it to replace the piece taken from the first. Both patients lay together on the same operating table. The flap was secured in place by two vertical silk threads lying parallel and close together that had previously been introduced 3*mm* above the margin of the cornea. The dressing was changed on the third day when the conjunctival sac was found to be full of accumulated mucus, in spite of which the piece of cornea was adherent. Then a little opacity set in, which disappeared again in a few days. There was no budding of blood-vessels in the transplanted piece. The vision has remained $\frac{1}{60}$ for a year and no opacity is to be expected any longer. The patient is able to go about alone, and can read Jaeger 23, though with difficulty, at 5*cm*. In the evening she needs a companion on the street, but she is able to do her housework alone, which was impossible formerly.

ADAM.

WATANABE (127, **Pathological condition in parenchymatous keratitis**) had the opportunity to enucleate an eye with fresh parenchymatous keratitis from a patient 18 years old, and to examine it histologically. He divides the corneal tissue into three layers. The outermost layer he found least altered; a slight œdematous infiltration may be inferred from the dilatation of the fluid spaces; the epithelium was irregularly thickened and was provided in many places with conical processes which give a wavy course to Bowman's membrane and the most anterior layers of the parenchyma. The changes in the middle layer were greater. Between the bundles of fibers were heaps of mononucleated round cells, partly arranged in rows, with newly formed vessels surrounded by cells. The fluid spaces were not dilated, and the bundles of fibers lay closer together than in the anterior layer. The posterior layer was the most diseased, which showed in some places a great infiltration of cells, in others necrotic patches. The tissue had apparently been œdematous, had been driven slightly toward the anterior chamber, and took no stain in places. The total absence of vessels was striking in contrast to the middle layer. These findings were mainly in the central portion. In the periphery the infiltration of cells came into the foreground, together with many bands of connective tissue. The intact Descemet's membrane had its posterior surface covered by a layer of connective tissue structurally like that of the cornea, which apparently came from the sinus of the chamber, was relatively thick in the periphery, grew thinner toward the center, and showed a moderate infiltration of cells throughout. Peripheral folds of Descemet's membrane and of the most posterior layers of the parenchyma were evident consequences of the tendency to sclerosis and to firm fixation of the connective tissue. Hyperæmia and a moderate infiltration of cells were also present in the scleral and episcleral tissues.

The case of gonorrheal keratitis reported by STREBEL (126, **Gonorrheal keratitis after reinjection of gonococcus vaccine**) occurred in a woman 25 years old, who presented all the indications of an endogenous disease—that is, she had urethritis with gonococci at the time of the first attack of keratitis, together with other signs of a general gonorrheal infection, absence of any other cause, absence of gonococci in the conjunctival sac, and a keratitis presenting an unusual picture. The primary seat of the infiltrate was subepithelial, in the parenchyma of the cornea, another indication that the infection was endogenous. As the keratitis appeared twenty-four hours after a reinjection of 10*ccm* of gonococcus vaccine, it may be that it should be considered an anaphylactic keratitis, that it was a local reaction to the injection of homologous bacterial albumin.

Kaz (122, **Eserine ointment in scrofulous keratitis**) recommends eserine ointment because of the wonderful effect one often sees on the blepharospasm and on the cornea itself. He ascribes the benefit to the quieting of the iris, together with the relaxation and better drainage of the infiltrated cornea. The contraction of the pupil enlarges the surface of the iris, unfolds the crypts, and opens more broadly the filtration angle, producing a better condition of nutrition, and so easier healing of the ulcerated cornea. It is probable that the pupil is commonly much dilated in spite of the blepharospasm.

Causé.

Piccaluga (125, **Filamentous keratitis**) distinguishes two forms of this peculiar disease, of which he has had the opportunity to observe five: (1) the idiopathic or typical; (2) the post-operative or atypical. The first form includes all those cases in which the affection appears in apparently healthy corneæ with ulcers, and in interstitial or herpetic keratitis; the second, those following operation or deep wounds of the cornea.

Calderaro.

Kuemmell (123, **Treatment of ulcus serpens**) describes the methylhydrocuprein treatment. After rendering the cornea anæsthetic he applies a 2% solution, holding it in contact for half a minute. Then he instills a 1% solution every hour, taking care that it comes in actual contact with the ulcer. This is maintained until the ulcer is thoroughly cleansed. It may be necessary to apply the 2% solution a second time in obstinate cases. The iritis is treated with atropine. He reports seventeen cases thus treated which show clearly the good effect of the remedy, only one proving obstinate.

Attias (117, **Periodic marginal keratitis**) saw a man 52 years old, in good general condition, who for several years had suffered from attacks of pain in his right eye, often lasting two or three days, and occurring periodically every twenty-eight or thirty days, accompanied by a slight pericorneal injection. The conjunctiva presented many swollen vessels that penetrated into the upper layers of the cornea, where there was a whitish opacity *2mm* from the limbus, and occupying a third of the corneal circumference. In the intervals there were no inflammatory symptoms, and no signs of ulceration ever appeared

Calderaro.

Meisner (124, **Metastatic scleral abscess**) reports a case of this nature seen in a man 46 years old who was suffering from furunculosis, post-gonorrheal arthritis, and posterior urethritis. The scleral abscess was incised, staphylococcus aureus was found in the pus, the blood was sterile though a chill a few days before indicated that the blood current had been flooded with the micro-organisms. The source of the infection could not be definitely ascertained, the staphylococci may have come from a furuncle, or from a primary focus in the bladder or prostate. The staphylococcus aureus could be found in the urine, and the prostate had been massaged shortly before the occurrence.

Cockayne (119, **Hereditary blue sclerotics and brittle bones**) reports a case of a child who had blue sclerotics, and X-rays showed thinning of the extremities of the shafts of the long bones. The epiphysis showed no evidences of rickets. The child's father and his sister had blue sclerotics and broke their bones with apparently insufficient cause. The grandfather and his sister had brittle bones, as also did the great-grandfather. Cockayne thinks the defect is one of the mesoblastic tissue development.

Curran.

XV.—IRIS AND PUPILS.

128. Chaillous. **Treatment of transparent cysts of the anterior chamber with electrolysis.** *Annales d'oculistique*, cli., p. 461.

129. Finkelnburg. **Double reflex immobility of the pupils after traumatism to the skull.** *Deutsch. med. Wochenschrift*, p. 1005.

130. Jocqs and Duclos. **Ocular tuberculosis.** *Ann. d'ocul.*, cli., p. 465.

131. Nonne and Wohlwill. **Clinical and anatomical study of a case of isolated reflex immobility of the pupil, paralysis, tabes, and cerebrospinal syphilis being excluded.** *Neurol. Centralbl.*, 1914, p. 611.

132. Raubitschek. **Tumors of the iris.** *Klin. Monatsbl. f. Augenh.*, p. 683.

133. Tertsch. **Spontaneous cysts of the iris.** *Arch. f. Ophthalm.*, 88, p. 72.

134. Zur Nedden. **Pupillary difference in consequence of unilateral corneal scars.** *Klin. Monatsbl. f. Augenheilkunde*, lii., p. 844.

Jocqs and Duclos (130, **Ocular tuberculosis**) report the case of a boy 15 years old in whom a superficial lesion of the cornea led to the development of a grave tuberculous disease of the cornea and iris that rendered enucleation necessary. In the cornea were whitish nodules separated from one another by clear tissue. In the microscopical preparations characteristic tuberculous changes could be seen in the cornea and iris, but no bacilli could be found.

CAUSÉ.

RAUBITSCHEK (132, **Tumors of the iris**) describes three cases. One was mixed melanosarcoma and endothelioma. The unpigmented, rather atypical connective-tissue parts represented perhaps intermediate steps in the development of the melanosarcoma cells. The second was a granulation tumor, the origin of which could not be ascribed to tuberculosis either clinically or bacteriologically. A wound and the presence of a foreign body were excluded also. The third was a tumor of granulation tissue with a central abscess of doubtful ætiology. Tuberculosis was excluded.

CHAILLOUS (128, **Electrolysis of transparent cysts of the anterior chamber**) passes a needle, the positive pole, through the limbus into the cyst and sends through it for two minutes a current of four milliamperes. He reports the case of a young girl treated in this manner, in whom there had been no recurrence at the end of a year.

CAUSÉ.

TERTSCH (133, **Spontaneous cysts of the iris**) divides cysts of the iris into those that lie in the stroma, and those situated in the layers of the pigment epithelium. Of 51 cases reported in literature 37 belong to the first group. The cyst forms a gray, lustrous bleb extending almost to the cornea. The preferable treatment is excision of part of the iris with the cyst, but injection of tincture of iodine has been proposed. Another classification of these cysts that he proposes is to divide them into three groups: (1) cystoid transformation of endothelial or epithelial cells implanted in the stroma of the iris, or a cystoid dilatation of hollow spaces in the stroma; (2) distention of a preformed hollow space on the posterior surface of the iris, formed by a ciliary process; (3) a situation between the layers of the pigment epithelium with development toward the posterior chamber.

ZUR NEDDEN (134, **Pupillary difference in consequence of unilateral corneal scars**) has seen in several cases of central, dense opacity of the cornea a dilated pupil in the other eye. This is not always the case, but is to be seen often. In none of the cases could he find any special cause for the dilatation of the pupil. He supposes that the eye with the central scar adjusts itself to be able still to see by dilating its pupil. This peculiar adjustment seems to be suitable because of the absence of binocular vision.

FINKELNBURG (129, **Double reflex immobility of the pupils after traumatism to the skull**) gives as conditions of the presence of a traumatic double reflex immobility of the pupils that (1) the normal function existed before and immediately after the accident; (2) the injury was considerable; (3) the immobility appeared after at least eight days; (4) syphilis is absolutely excluded. The case he describes fulfilled these conditions almost perfectly. The possibility that convergence and accommodation were paralyzed at first is not quite excluded, so an ophthalmoplegia interna may have been present. It is difficult to say where the cause lies, but we have to think of a lesion of the central part of the reflex pupillary arch.

NONNE and WOHLWILL'S (131, **Isolated reflex immobility of the pupils**) case was a rare one of reflex immobility of the pupils without any other indications of tabes, general paresis, or cerebrospinal syphilis to be found. Autopsy revealed pulmonary tuberculosis, degeneration of the cardiac muscle, syphilitic aortitis. The brain and spinal cord were perfectly normal. Hence it seemed to be a trace of a former syphilitic affection that had apparently been cured, especially as the examination of the liquor was negative. Such a case is rare and is a warning to care in the diagnosis of taboparalysis.

XVI.—LENS.

135. ANDOGSKY. **A contribution to the ætiology of opacity of the lens.** *Klinische Monatsblaetter fuer Augenheilkunde*, lii., p. 824.

136. BURDON-COOPER. **Pathology of cataract; the hydrolysis theory.** *Ophthalmic Review*, May, 1914, p. 129.

137. CONSTANTINESCO. **Advancement of the conjunctiva in extraction of cataract.** *La clinique ophtalm.*, xx., p. 74.

138. DANSFORTH, C. H. **Some notes on a family with hereditary congenital cataract.** *American Journal of Ophthalmology*, June, 1914.

139. FALCHI. **Cataract operations in diabetics.** *Arch. di Ottalm.*, 1913, p. 41.

140. GOLDSCHMIDT. **The mechanism of the disintegration and absorption of the lens.** *Arch. f. Ophthalm.*, lxxxviii., p. 405.

141. GUANAITA and ANNONI. **Efficient treatment of post-operative infection of the eye.** *Ibid.*, p. 558.

142. HIPPEL. **Abderhalden's method in senile cataract.** *Ibid.*, lxxxvii., 3, p. 563.

143. JOCQS. **Intervention in traumatic cataract.** *La clin. ophtalm.*, xx., p. 71.

144. MEYER–STEINEG. **The non-operative treatment of senile cataract.** *Wochenschrift f. Ther. u. Hyg. d. Auges*, 1914, Nos. 27 and 28.

145. MULGUND, N. **A method of operating on immature cataract with shallow anterior chamber.** *Ophthalmoscope*, April, 1914, p. 207.

146. PASCHEFF, E. **Cataract extraction combined with a peripheral iridectomy.** *Annales d'oculistique*, cli., p. 424.

147. VACHER, L., and DENIS, M. **Conjunctival bridge, conjunctival flap, suture of the cornea, and Van Lint's suture in the operation for cataract.** *Ibid.*, p. 409.

148. VALUDE, E. **Cataract extraction with or without iridectomy.** *Ibid.*, p. 250.

149. VAN LINT. **Postoperative astigmatism in cataract extraction with sliding of the conjunctiva.** *Ibid.*, p. 418.

150. VAN LINT. **Temporary paralysis of the lids provoked by the operation for cataract.** *Ibid.*, p. 420.

151. VOGT. **Clinical and anatomical contribution to the subject of senile cataract.** *Archiv f. Ophthalmologie*, lxxxviii., 2, p. 329.

Roemer and Gebb have claimed that Abderhalden's optic method shows constant differences between serums of normal and cataractous individuals, the latter giving positive results. VON HIPPEL (142, **Abderhalden's method in senile cataract**) found in a series of twenty-eight cataract patients that only three showed a positive reaction, and this was obtained by the ninhydrin as well as by the optic method. Roemer's results are due to errors in the experimental technique.

SCHIRMER.

Becker and Foerster seemed to have proved by the careful examination of commencing cataracts *in vivo*, as well as *in toto* after extraction, and by the microscopical examination of sections, that the formation of cataract always begins at the surface of the nucleus, or within the cortex, never just beneath the capsule. Hess has claimed in recent years that in the majority of cases the first cataractous opacities are found directly under the capsule, and founded on this preponderancy of the subcapsular onset his theory. Roemer, in his serological researches, accepts the subcapsular onset as an undoubted fact. Nevertheless there are no careful examinations in existence to prove that the subcapsular layers are the starting point. No picture of a subcapsular cataract is found in literature, although splendid pictures of the supranuclear form are given in all text-books. In order to corroborate or refute the views of Hess, VOGT (151, **Clinical and anatomical contribution**) has made very careful clinical and anatomical researches in a large number of commencing cataracts. He has examined more than four hundred patients over 60 years of age in homatropine mydriasis with the loupe mirror, many of them with Zeiss's binocular corneal microscope. More than ninety per cent. showed beginning opacities in the lens, but in not one of them was the onset directly under the capsule. The first opacities were found mostly at the surface of the nucleus. Vogt furthermore has examined fifty lenses of old people extirpated from corpses. They were embedded in vitreous and examined with a 24–54-fold enlargement. The surface was quite intact in all of these cases. Several of the lenses were cut in halves, when the cross-section again showed the onset to be at some distance from the capsule. Based on these extensive and careful researches, Vogt makes the assertion that Hess's claim of the subcapsular onset of cataract, and all theories resting on this anatomical ground, are erroneous.

SCHIRMER.

It is mentioned in few text-books that skin affections may lead to the development of cataract. ANDOGSKY (135, **Ætiology of opacity of the lens**) reports four cases of so-called cataracta dermatogenes. The opacities develop early, on both sides, and usually in the form of an anterior stellate cataract. Later the picture becomes that of a complete soft cataract, the length of time required varying greatly. The prognosis of operation is good. The ætiological connection is difficult to determine.

MEYER–STEINER (144, **Non-operative treatment of senile cataract**) has dealt with this subject before. He now reports further experiences and maintains his stand that commencing cataracts may be influenced, improved, and caused to disappear medicamentally. He has observed fifty-four cases, and the condition has grown worse in only four; the rest were all improved. One is therefore justified in saying that a good effect may be obtained in four-fifths of the cases. He regulates the patient's mode of life, gives him ½ to 1 tablet of iodglidine daily, and instills locally iodide of sodium 0.05 to 0.1 : 10.0, later with dionin added. Eye baths and subconjunctival injections have the same result. He recommends that a trial be made of medicamental treatment in suitable cases of incipient cataract. Even when the treatment fails, it produces an excellent psychical impression upon the patient. One has also the satisfaction of feeling that he has done what he could when an operation finally becomes necessary.

According to FALCHI (139, **Cataract operations in diabetics**), the extraction of cataract may be undertaken in diabetics when the general condition is satisfactory, and the sugar is no longer increasing. Better results are obtained in young patients than in older ones. The result is bad when there has been an iritis already, probably because of its tendency to recur. When there is double cataract, both must not be removed at the same sitting. Preliminary iridectomy is to be avoided as it may easily excite an iritis. In case the diabetic has had no treatment prior to coming for an operation, it is best to try to reduce the sugar and to build up his strength before attempting it. The visual results may be good or only moderate, and are permanent. Extraction may be contraindicated by the general condition, an increase of glycosuria, diseases of other organs, or the onset of preliminary symptoms of diabetic coma.

The treatment of postoperative infection according to GUANAITA and ANNONI (141, **Efficient treatment of postoperative infection**) is as follows: If the margins of the corneal wound are infiltrated, whether the anterior chamber is reformed or not, the wound must be more or less extensively cauterized according to the degree of the infiltration. At the same time subcutaneous injections are to be given in the temple of 15*cg* of calomel in ½*gr* of a mixture of equal parts water and glycerine, while injections of polyvalent antistreptococcus serum are to be given in the abdomen. This injection is to be repeated from three to five times every other day. It causes no disturbance. Morning and evening 10*cg* of calomel are given by mouth for several days. The eye is covered with cloths wet in cold boric-acid solution, changed every ten minutes. Every six hours, four times a day, hot boric-acid compresses are applied, with the instillation of a 1% solution of picric acid, and after ten minutes of a 1% solution of atropine. The same treatment may be used in deep wounds of the eye, in case the infection is not very far advanced.

CALDERARO.

MULGUND (145, **A method of operating on immature cataract with shallow anterior chamber**) injects sufficient normal saline into the anterior chamber to make it deeper for the operation of removal of cataract where there is a shallow anterior chamber. This is done with a very fine needle, exactly at the limbus. He has done it in eighteen cases and, in each case, it has proved satisfactory.

CURRAN.

PASCHEFF (146, **Extraction with a peripheral iridotomy**) recommends a peripheral incision of the iris in cataract extraction in order to obviate the disadvantages of a complete iridectomy or of a prolapse of the iris.

SCHOENBERG.

VAN LINT (149, **Postoperative astigmatism in cataract extraction with sliding of the conjunctiva**) replies to his opponents who object to his method on the ground that the pressure of the flap may increase the astigmatism, by reporting that in three cases he has found an astigmatism of 2.5, 4, and 3.5 D., respectively, shortly after the operation, which is not above the usual amount found after the classical methods in use.

SCHOENBERG.

CONSTANTINESCO (137, **Advancement of the conjunctiva in extraction**) has used the following method in seventy-five cases and has seen no infection. He first dissects up the conjunctiva for about 1*cm* toward the caruncle, the upper transition fold, and the outer canthus, and inserts sutures ready to tie. Then he performs the operation in the usual way. Finally he ties the sutures, which should draw down the conjunctiva so as to cover nearly half of the cornea. If the wound is insufficiently covered, the covering must be made complete. The sutures are removed in a week. He points out the danger of postoperative infection from lacrimal passages that functionate only too well, especially in atrophic rhinitis and old, unrecognized diseases of the accessory sinuses, but he is convinced that a thorough application of his method will prevent any infection whatever. The only objection is the slight prolongation of the operation.

CAUSÉ.

VACHER and DENIS (147, **Conjunctival bridge, conjunctival flap, suture of the cornea, and van Lint's suture in extraction**) compare the advantages of these various methods of closing the wound after an extraction, and conclude that the maintenance of a conjunctival bridge uncut, extending from the cornea to the rest of the bulbar conjunctiva, is the best method. Their experience is based on about a thousand operations, and they assert that the various dreaded complications, like folding back of the cornea, loss of vitreous, prolapse of the iris, incarceration of the capsule, iritis, secondary cataract, glaucoma, and panophthalmitis, are thus best avoided.

SCHOENBERG.

VALUDE (148, **Cataract extraction with or without iridectomy**) maintains that cataract extraction with iridectomy is to be preferred, not only because of its prevention of incarcerations of the iris in the wound, but mostly on account of the facility with which the cortical mass can be extruded. It has the great advantage of preventing a secondary cataract.

SCHOENBERG.

BURDON-COOPER (136, **Pathology of cataract; the hydrolysis theory**) has conducted a series of micro-chemical analyses of the aqueous and of the lens in cataract. He finds tyrosin to be constantly present in the aqueous in cases of cataract. In all of the cases there was much tyrosin and cholesterin in the lens. He argues that tyrosin of the aqueous comes from the lens and that it is brought about by hydrolysis of the lenticular proteid. His researches agree with clinical observations that cataract need not be a constantly progressive condition, but that comparatively sudden lens changes may take place, and that there is a definite relationship between cataract and renal insufficiency. The hydrolysis theory, too, according to Burdon-Cooper, explains the occurrence of black cataract. He finds no evidence of blood pigment on spectroscopic examination of three black cataracts, and therefore discards the theory of infiltration of hæmatin. He argues that the color of the lens is due to oxidation of tyrosin with the production of pigment, and holds that the hydrolysis theory is the only one which can explain satisfactorily the occurrence of black cataract.

CURRAN.

VAN LINT (150, **Temporary paralysis of the lids after extraction**) has found that the injection of 3-4*cc* of a 1% solution of novocain containing three drops of a 1 : 1000 solution of adrenalin hydrochloride along the branches of the facial nerve going to the orbicularis produces a temporary paralysis of both lids. He employs this method in cataract extraction in order to prevent any pressure and consequent loss of vitreous during the extraction, mostly in unruly patients. The technique is simple. The syringe has to be large enough to contain 3 or 4*cc* and the needle needs to be about 3*cm* long. The needle is introduced 1*cm* behind the external orbital margin on the same level as the lower orbital border; it is then pushed horizontally and slightly downward deeply along the periosteum. When it is completely inserted it is gradually withdrawn and half of the solution is pressed out of the syringe into the tissues. The injection is made along the other branches of the facial by directing the needle from the same point of entrance towards the upper border of the orbit, running along the periosteum and injecting the solution while retiring. The injection takes effect in three minutes, and the orbicularis is paralyzed for about two hours. The safety of the procedure and the feeling one has that the patient is not able to squeeze his lids over the opened eyeball during the operation give great comfort to the surgeon.

SCHOENBERG.

DANSFORTH (138, **Hereditary congenital cataract**) reports a family in which the grandmother, both her children, and six out of eight grandchildren had congenital cataracts. He brings out the point that lamellar cataracts may be of two kinds, one having origin in some disturbance in intrauterine life, the other hereditary. The latter seems to be less typical in form. It would seem important to be able to distinguish between the two for eugenic reasons. Nothing is known of the embryology of congenital cataract although some experiments have been carried on in animals.

ALLING.

JOCQS (143, **Intervention in traumatic cataract**) does not believe in waiting too long for the spontaneous absorption of a traumatic cataract; he prefers rather to operate as soon as it is certain that the opacities will undergo no retrogression. He reports a case of an intraocular injury with a splinter of iron in a man 27 years old, in which the iron was smoothly extracted through the wound of entrance on the day after the accident. The diffuse opacity of the lens seemed at first inclined to clear up, but the course was slow, so after about three months he extracted the lens in a single sitting with an excellent visual result.

CAUSÉ.

GOLDSCHMIDT (140, **Mechanism of the disintegration and absorption of the lens**) finds that the albuminous substances of the lens are partly soluble in water, partly not soluble. The former include α crystallin, β crystallin, and albumin, the latter albumoid. As we know from daily experience that the entire lens can become dissolved in the aqueous, there must be a way to change the albumoid into a compound that gives a colloidal or a real solution. This can be accomplished by simple autolysis, as is proved by the dialysis of a lens in a hose against distilled water. In the living eye, however, this process is accelerated by a proteolytic ferment of which a small amount is present in the normal aqueous. The irritation due to the swelling lens increases the quantity of this ferment, for which the lens fibers have a great avidity of absorption. Finally blood elements are to be mentioned. They also contain proteolytic ferments which they deliver when in contact with the swollen lens fibers.

SCHIRMER.

XVII.—VITREOUS AND CHOROID.

152. ARISAWA. **Metastatic carcinoma of the choroid from a latent primary tumor.** *Klinische Monatsblätter f. Augenheilkunde*, lii., May, 1914.

153. HAM. **Retinochoroiditis juxta papillaris.** *Ibid.*, p. 484.

154. KOMOTO. **So-called atrophia gyrata of the choroid and retina.** *Ibid.*, p. 416.

155. RERRAL. **Peripapillary sarcoma of the choroid.** *Annali di Ottalm.*, f. 5–8, p. 539.

HAM (153, **Retinochoroiditis juxta papillaris**) adds one more case to the few of this disease that have already been observed. The affection began in his patient at the age of 17 with obscured vision and pain. A whitish infiltrate formed near the papilla, but this never extended to the macula. The vision was good, but there was a permanent defect in the field. An artery ran through the pathological focus. The prognosis is good. There is no treatment. The ætiology is doubtful; there were no signs of syphilis or of tuberculosis.

NICOLAI.

KOMOTO (154, **Atrophia gyrata**) says that only six cases of atrophia gyrata of the retina and choroid have been reported, to which he adds another. Symptoms common to all are consanguinity, hemeralopia, reduced vision, contracted visual field, and myopia. The entire clinical course of the disease gives the impression that it is a congenital process, like retinitis pigmentosa, that develops early.

NICOLAI.

It rarely happens that a tumor in the eye imposes upon one as primary, when it is really metastatic and the primary tumor gives no clinically demonstrable signs. ARISAWA (152, **Metastatic carcinoma of the choroid**) describes such a case. A thorough general examination revealed no condition to lead one to suspect the presence of a tumor in any other place, so the diagnosis was made of a sarcoma of the choroid and the eye enucleated. The microscopical examination proved it to be a carcinoma. A year later intestinal trouble developed, and some months afterward autopsy revealed a carcinoma of the rectum. The metastasis into the eye usually takes place through the posterior ciliary arteries.

RERRAL (155, **Peripapillary sarcoma of the choroid**) reports the case of a man 68 years old who had noticed three months before that he had lost the sight of his right eye, and had suffered from severe pains in the brow for over a month. The pupil was immobile, and dilated incompletely under atropine. A circumscribed yellowish mass, having a diameter of four papillæ, could be seen springing from the region of the papilla, with many vascular anastomoses on its surface. The retinal vessels portrayed the form and position of the tumor distinctly. Tension was 18*mm* of mercury. Cutaneous reaction and Wassermann were negative. The eye was enucleated and the tumor found to be a papillary leucosarcoma of the choroid.

CALDERARO.

XVIII.—GLAUCOMA.

156. BEHR. **Anatomical changes and filling up of excavations in the papilla in the course of glaucoma.** *Klin. Monatsbl. f. Augenheilk.*, June.

157. BUDEK. **Two rare infections of the eye.** *Prager med. Wochensch.*, No. 9.

158. BUTLER, T. H. **Holth's punch operation for glaucoma.** *Ophthalmoscope*, June, 1914, p. 329.

159. FAGE. **Prognosis and treatment of hydrophthalmos.** *Ann. d'ocul.*, cli., p. 460.

160. FORONI. **Sclerectomy from outside.** *Annali di Ottalm.*, f. 5–8, p. 483.

161. HEERFORDT, C. F. **Remarks on the glaucomatous congestion of the anterior ciliary vessels.** *Arch. f. Ophthalm.*, lxxxvii., 3, p. 494.

162. ISCHIKAWA, K. **Schnabel's caverns.** *Ibid.*, p. 429.

163. KUEMMELL. **Glaucoma and diseases of the cardiovascular system.** *Muenchener medizinische Wochenschrift*, No. 18.

164. LAGRANGE. **To elevate the ocular tension.** *Ann. d'ocul.*, cli., p. 460.

165. LOEHLEIN. **Glaucoma and the general organism.** *Zentralbl. f. d. ges. Ophthalm.*, Part 9.

166. MORAX and FOURRIERE. **Surgical treatment of chronic glaucoma.** *Annales d'oculistique*, cli., p. 321.

167. PAUL. **Late infection after Elliot's trephining.** *Klin. Monatsbl. f. Augenheilkunde*, May, p. 701.

168. PUSCARIN, ELENA. **Elliot's sclerocorneal trephining in secondary glaucoma.** *La clinique ophtalm.*, xx., p. 215.

169. REBER, WENDELL. **Report of twenty-six sclerocorneal trephinings, Elliot's operation, for glaucoma.** *Ophthalmoscope*, April–May, 1914.

170. ROCHON–DUVIGNEAUD. **Contribution to the study of the results of sclerocorneal trephining with iridectomy (Elliot's operation).** *Ann. d'oculistique*, cli., p. 455.

171. ROLANDI. **High myopia and glaucoma.** *Annali di Ottalm.*, f. 5–8, 1913.

172. SULZER, M. D. E. **The results of surgical treatment of glaucoma from its beginning to the present time.** *Ann. d'ocul.*, cli., p. 401.

173. YOUNG, GEORGE. **Decompression in glaucoma.** *Ophthalmoscope*, April, 1914, p. 194.

YOUNG (173, **Decompression in glaucoma**) claims that to reduce hypertension it is not necessary to open the anterior chamber or touch the uvea; and that success lies in causing single or multiple leaks in the sclera. He holds that hypotonies are due, not to trephining, but to iridocyclitis caused by wounding the sclera. Young makes a large conjunctival flap down as far as the corneal attachment, and trephines two

1.5*mm* holes 6*mm* apart, in the sclera very close to the cornea, but not taking in any corneal tissue and not injuring any other structures. The flap is then closed by sutures. He claims to get drainage through the ciliary body.

CURRAN.

FORONI (160, **Sclerectomy from outside**) proposes a modification of Lagrange's operation. After forming a conjunctival flap he excises a wedge-shaped piece of the sclera 5*mm* long by means of two converging incisions with a Graefe knife.

CALDERARO.

PUSCARIN (168, **Elliot's sclerocorneal trephining in secondary glaucoma**) reports five cases of secondary glaucoma from traumatic cataract, adherent leucoma, and chronic iritis, in which she performed sclerocorneal trephining. She obtained a diminution of tension in all and an improvement of vision in two.

SCHOENBERG.

ROCHON-DUVIGNEAUD (170, **Results of corneoscleral trephining with iridectomy**) says that the operation was borne well in two cases of hemorrhagic glaucoma, but a filtration cicatrix was not formed; in one case the tension recurred, in the other the eye became hypotonic with detachment of the retina. In eleven eyes with secondary glaucoma the operation produced a beneficial effect in only one. Of six eyes with primary absolute, or far advanced, glaucoma none healed with an œdematous scar, but two were relieved from pain, though the tension remained high. In two cases of acute glaucoma the tension was reduced, though without a filtration cicatrix. Excellent results were obtained in four out of ten eyes operated on for chronic intermittent glaucoma. Twenty-five cases of glaucoma simplex were trephined, but only sixteen could be followed; in thirteen of these a filtration cicatrix with subnormal tension was attained, giving about 70% of good results, about the same as in chronic glaucoma with inflammatory intermissions. In the other forms of glaucoma the operation must be used with care. In the discussion Lagrange emphasized the point that the sclera alone should be the seat of the operation, and that the cornea and ciliary body must remain untouched. Abadie has performed a great number of iridectomies and is much pleased with his results. It is necessary that the technique be faultless. At any rate he believes that an iridectomy should be performed first, and that only when this operation has failed should we perform sclerectomy or trephining.

CAUSÉ.

BUTLER (158, **Holth's punch operation for glaucoma**) prefers this operation for glaucoma on the grounds that it is easier and safer, and quicker than all others. It is devoid of many of the dangers of the Elliot operation, such as pressure of trephine, dislocation of lens, losing the disk in the eye. He uses it now for all varieties of glaucoma. Butler, however, uses a lighter pattern of punch than Holt's modification and also his own special broad needle for making the incision. He has done twenty-nine cases, four of which failed owing to defective technique. One case showed free filtration but tension was not reduced; and the sixth was a case of late infection; the remaining twenty-three were successful.

CURRAN.

MORAX and FOURRIERE (166, **Surgical treatment of glaucoma**) deal with the results of surgical treatment of chronic glaucoma during the last eight years at the Lariboiserie. Thirty-seven men and forty women have been operated on. Five were between 30 and 40 years of age, the majority between 50 and 70. Both eyes were affected in all but fourteen. Iridectomy and sclerecto-iridectomy were employed; the latter at first according to Lagrange's method, later according to Holth and Fergus-Elliot. As many as three trephinings were needed in some cases; when the tension was particularly high a posterior sclerotomy was performed in order to avoid a brusque fall of tension. Complications observed were one each of loss of vitreous, expulsion of the lens with prolapse of vitreous, and expulsive hemorrhage. The last case resulted in atrophy, but the other two did well. Postoperative complications were twisting of the flap after trephining, long persistent hyphæma, and postoperative pain. Late infection was observed after sclerectomy, likewise a serious hemorrhage into the vitreous, and a late opacity of the center of the cornea. The restoration of the anterior chamber required a shorter time after Lagrange's and Holth's operations than after trephining. In general it was observed that the slower re-formation of the anterior chamber gave a better prognosis for the formation of a filtration cicatrix and therefore for the compensatory action of the scar upon the tension. Iridectomy was performed alone only twenty-three times since the tonometer began to be used, and this generally proved insufficient. The tension remained within normal limits during a prolonged period of observation in 22 out of 24 cases of Lagrange and Heth operations, in 17 out of 21 trephinings. Persistent fistulæ remained in 20 out of 30 operated on by the Lagrange-Holth method, in 16 out of 21 trephinings. The period of observation ranged from two weeks to six and a half years. The functional results were good at the end of a year or more in 14 cases of sclerecto-iridectomy and in 5 cases of trephining. The danger of the operation is not increased by a much contracted visual field. Holth's operation he thinks the one of choice, next is Elliot's. The object is to obtain a filtration scar, but in spite of it the tension is often seen to rise again and the eye to be lost. Late infection cannot always be avoided.

CAUSÉ.

REBER (169, **Report of twenty-six sclerocorneal trephinings for glaucoma**) in his experience with twenty-six cases had, among others, the following points impressed upon him:

1. The glaucomatous eye can be approached by the surgeon with more hopefulness than before.
2. We must expect a longer postoperative reaction on account of the aqueous finding a new channel for filtration and here acting somewhat as a foreign substance.
3. Quiet iritis is not infrequent.
4. Large flap gives the best chance of infiltration.
5. If conjunctival tissues are thick and infiltrated, it is better to suture the flap.
6. When the flap is dissected to cornea, it is better to use a cotton-wrapped applicator; this holds down the flap and keeps the field clear.
7. A 2*mm* trephine is most satisfactory.

CURRAN.

PAUL (167, **Late infection after Elliot's trephining**) adds another case of this nature. The operation produced a good result that lasted for ten months, when panophthalmitis suddenly set in. Streptococci were found in the vitreous of the enucleated eye. At one place of trephining, without iridectomy, there was no trace of cicatrization, but it was filled by a prolapse of the uvea so that a fistula was left between the cornea and iris. Here there was only a slight infiltration of small cells. The place of the other trephine opening, with iridectomy, was examined only partially, but it likewise appeared to be without cicatrization. The covering conjunctiva was perforated and infiltrated greatly with small cells. The latter were also found about the opening. Evidently this was the place of entrance of the infection.

BUDEK (157, **Two rare infections of the eye**) reports one case of infection nine months after Elliot's trephining. A plug of pus occupied the trephine opening and contained xerosis bacilli, while the bacillus mesentericus subtilis was obtained from the vitreous by aspiration. The result was chronic iridocyclitis with almost total loss of vision. The other case was one of infection after operation for detachment of the retina, by aspiration of the subretinal fluid and filling the vitreous with salt solution.

FAGE (159, **Hydrophthalmos**) does not like iridectomy because of the dangers of prolapse of the vitreous, luxation of the lens, and intraocular hemorrhage. Sclerotomy is simple and may be repeated many times. He has treated 14 cases in this way, and seen the enlargement of the eye arrested and normal tension in five. In many cases the formation of a cystoid cicatrix is particularly beneficial, and then Elliot's operation is indicated.

CAUSÉ.

LOEHLEIN (165, **Glaucoma and the general organism**) says that the increase of blood pressure is doubtless a factor in the production of glaucoma, but is by no means the only one. The fullness of the vessels, which may not change the pressure, must be taken into account, for an increase or a decrease of the ocular tension may result from a greater or less fullness of the vessels of the eye. For the dependence of glaucoma on the cardiovascular system there must be taken into account: (1) intraocular vascular changes; (2) increases of the blood pressure due to diseases of the heart, or of the vessels, especially of the kidneys; (3) obstructions to the venous flow; (4) abnormal distribution of the blood. Disturbances of the cardiovascular system cannot be an essential cause of the origin of glaucoma; they can excite it only in an eye previously predisposed. The recent researches of Hertel concerning the molecular concentration of the blood are of greater importance to the ocular tension, as a reduction of the tension follows the introduction of hypertonic solutions into the circulation.

KUEMMELL (163, **Glaucoma and diseases of the cardiovascular system**) has studied seventy cases with regard to this connection. He finds that the blood pressure averages 20*mm* higher in glaucomatous persons than in others, 165.7*mm* of mercury instead of 145.2. Increase of the blood pressure can be demonstrated in four fifths of the cases. In acute inflammatory glaucoma the average blood pressure of 14 cases was 177*mm*, almost the same in chronic, 175.2 in 18 cases, 160.6*mm* in hemorrhagic, while in the simple it was only 153.3*mm*. An acute or subacute glaucoma without increase of the blood pressure arouses suspicion of an atypical condition. A thorough general examination of the cases without increased blood pressure revealed other signs of disease of the cardiovascular and renal systems in all but four. These included organic and functional heart troubles, sclerotic and vasomotor vascular disturbances, and changes in the function of the kidneys. These changes evidently cannot produce glaucoma, but they play an important part in its ætiology.

HEERFORDT (161, **Glaucomatous congestion of the anterior ciliary vessels**) comes to the conclusion that arteries as well as veins may become dilated in glaucoma.

SCHIRMER.

BEHR (156, **Anatomical changes in the course of glaucoma**) reports two cases in which the glaucomatous excavation disappeared through the proliferation of newly formed tissue. In his first case there was a deep excavation extending to the margins in 1901; in 1913 it could not be seen because of opacity of the refractive media. Anatomical examination showed, together with other changes, an atrophy of the retina, which showed an approximately normal structure in a circle about the equator. The excavation of the papilla was filled with a glial tissue rich in nuclei, with numerous blood-vessels that projected above the level of the retina and overlay its neighboring parts. This tissue contained connected cysts. The lamina cribrosa was driven back considerably. A similar condition was present in the second case, in which the glial mass corresponded in extent to a physiological papilla. Apparently the glial tissue comes from the surface of the excavated lamina cribrosa.

Contrary to Morax's view that it is doubtful if the operative treatment of glaucoma is any more successful now than formerly, SULZER (172, **Results of surgical treatment of glaucoma from its beginning to the present time**) concludes that the results to-day not only equal, but surpass, those of former times in the regulation of the tension and the preservation of the function of the eye, especially through the efforts to obtain a permanent filtration cicatrix. While formerly results showed a certain fluctuation, this was mainly due to the instillation of miotics, so that many cases came too late to be operated on. All statistics show that the earlier the operation is performed the better. The longer the disease has lasted the more uncertain is the prognosis: the result may be wonderfully good, or it may be bad.

CAUSÉ.

ISCHIKAWA (162, **Schnabel's caverns**) examined microscopically ten glaucomatous eyes and found Schnabel's caverns in five globes where the glaucoma was comparatively fresh. They were missing in five cases with absolute glaucoma for several years. It is a well-known fact that the caverns disappear in such old cases because the elements of the optic-nerve tissue get closer together. He upholds Schnabel's theory that the caverns are characteristic of glaucoma and form a specific form of optic-nerve disease. They begin as an œdema of the nerve fibers, and these become dissolved later, thus forming caverns. The glaucomatous excavation is due to the collapse of these caverns. They are not to be found in other diseases, except in high myopia, when they are probably due to mechanical factors.

SCHIRMER.

In myopic individuals who complain of a considerable decrease of vision, ROLANDI (171, **High myopia and glaucoma**) says that attention should be directed to the condition of the staphyloma and the course of the retinal vessels, in case the changes in the fundus do not appear to be sufficient to explain the reduction, and when the papilla has a normal appearance.

If glaucoma is suspected, a careful regular investigation of the tension should be instituted with the tonometer, by which transient increases may be perceived.

CALDERARO.

LAGRANGE (164, **To elevate the tension**) recommends in order to elevate the tension of hypotonic eyes a cauterization at the filtration angle after the conjunctiva has been dissected up. By this a proliferation of firm cicatricial tissue is produced that closes the filtration angle, increases the tension, and so improves the nutrition of the eye. He has done this in cases of subnormal tension with detachment of the retina, and has cured the detachment in two cases. He thinks it indicated in persons with malignant myopia.

CAUSÉ.

XIX.—SYMPATHETIC OPHTHALMIA.

174. ELSCHNIG. **Refractometric investigations on the sympathetic transmission of irritation.** *Arch. f. Ophthalm.*, lxxxviii., 2, p. 392.

175. HIPPEL. **Abderhalden's dialysis experiment.** *Congress of Internal Medicine*, Wiesbaden, April 20 to 24.

176. MELLER. **On cases of sympathetic ophthalmia without characteristic changes in the primary eye.** *Arch. f. Ophthalm.*, lxxxviii., 2, p. 282.

HIPPEL (175, **Abderhalden's dialysis experiment**) comes to the conclusion, from his researches, that the danger of an impending sympathetic ophthalmia cannot be serologically determined.

Fuchs has claimed that the anatomical changes in the first eye are characteristic of sympathetic ophthalmia, and are found in this disease only. We can diagnose, therefore, an inflammation as a sympathetic one from the microscopical examination of the first eye. MELLER (176, **Cases of sympathetic ophthalmia without characteristic changes in the primary eye**) reports several cases in which the anatomical findings were not characteristic and tries to reconcile this fact with Fuchs's theory. The first two cases show a purulent inflammation, endophthalmitis septica. There are to be found, however, plenty of mononucleated cells, partly lymphocytes, mostly larger cells, which have a tendency to form nodules. He claims that such cells are never found in endophthalmitis, and that their presence proves the coexistence of endophthalmitis and sympathizing ophthalmia in these eyes.

In two other cases where the inflammation of the second eye did not show the characteristics of a sympathetic ophthalmia, the anatomical findings in the first eye, blind for several years after perforating ulcer or injury, corroborated the diagnosis of not sympathetic ophthalmia. The removed globes showed the consequences of an endophthalmitis that passed away years ago.

The last three cases belong, according to Meller, to the initial stage of the sympathizing inflammation. Small nodules were found in different parts of the uvea; some of them contained epithelioid cells. Endophthalmitis was present at the same time in two of these cases and had caused exudation; in the third the exudation was absent.

SCHIRMER.

Wessely has proved by his well-known experiments that no irritation of a rabbit's eye, whatever its intensity or duration may be, is capable of raising the percentage of albumin in the aqueous of the other eye. He concluded that it is impossible to influence one eye from the other. ELSCHNIG (174, **Refractometric investigations on the sympathetic transmission of irritation**) has repeated the same experiments, but using for the albumin test the refractive index of the aqueous instead of the precipitation test. He claims that his method gives more exact results, although the refractive index is influenced not by the albumin alone, but also to a slight extent by the salts. He arrives at the same results and conclusions as Wessely.

SCHIRMER.

XX.—RETINA.

177. AUBINEAU, E. **Retinal asthenopia.** *Arch. d'ophtalm.*, xxxiv., p. 264.

178. HARMS, C. **Unusual fundus conditions in juveniles.** *Arch. f. Ophthalm.*, lxxxvii., 3, p. 457.

179. LINDNER. **Pigmented striæ of the retina.** *Ibid.*, lxxxviii., 2, p. 230.

180. LINDNER. **A case of hemeralopia with whitish gray fundus.** *Ibid.*, lxxxviii., 2, p. 230.

181. TIFFANY, FLAVEL B. **New procedure for the cure of retinal detachment.** *Arch. d'ophtalmologie*, xxxiv., p. 373.

In continuation of his reports of rare cases of diseases of the retinal vessels HARMS (178, **Unusual fundus conditions in**

juveniles) gives full histories of the following cases: (1) Juvenile periphlebitis retinalis; (2) multiple retinal hemorrhages; (3) formation of retrovascular fibrous and pigmented streaks in a case of cyanosis of the retina; (4) circumscribed hemorrhagic detachment of the retina, or formation of intraretinal blood cysts. SCHIRMER.

LINDNER (179, **Pigmented striæ in the retina**) describes five typical and three atypical cases of this rare condition, which is known in English literature as angioid streaks. Starting from a ring around the disk a number of irregular streaks are to be found radiating in the fundus toward the periphery. They frequently are crossed by the retinal vessels and invariably are situated behind the same. Their caliber is changing constantly, their color varies from red to brown or gray. Frequently hemorrhages are found. The vision was satisfactory in the majority of cases, and the disease was discovered when the patient was examined for some other reason.

Lindner thinks that the disease is due to capillary hemorrhages in the deeper layers of the retina around the disk. The blood finds the least resistance toward the periphery and therefore is advancing in this direction.

Pigmented streaks which resemble somewhat these angioid streaks are sometimes found after operative detachment of the choroid. SCHIRMER.

LINDNER (180, **Hemeralopia with whitish gray fundus**) adds to the seven cases contained in literature a new observation. The patient, a Jewish boy of 16, is the only living child of parents who are second cousins. Not an albino. Vision very poor, field normal. Hemeralopia present from early childhood. This disease, which was described first by Dor in 1883, later by Oguchi, is closely related to retinitis punctata albescens, and retinitis pigmentosa. SCHIRMER.

AUBINEAU (177, **Retinal asthenopia**) says that he has seen seventy-four patients with asthenopia due to the rapid fatigue of the retina. He excluded, naturally, the cases with muscular imbalance, or with trouble of the accommodation. The paper brings out nothing that has not been known since the publications of Agnew, DeWecker, Meyer, and Abadie.

SCHOENBERG.

TIFFANY (181, **New procedure for the cure of retinal de-**

tachment) trephines, after Elliot's method, a portion of the sclera in the center of the area corresponding to the retinal detachment, and then excises the choroid that prolapses into the scleral opening. He considers his operation on one patient successful, who was seen one week afterward with the retina replaced. SCHOENBERG.

XXI.—OPTIC NERVE AND VISUAL TRACT.

182. CALHOUN, F. P. **Pseudo-optic neuritis.** *Ophthalmic Record*, May, 1914.

183. DUTOIT, A. **Neurotropic action of lipoiodine in optic neuritis.** *La clinique ophtalm.*, xx., p. 207.

184. PRICE, G. E. **A case of Tay-Sachs amaurotic idiocy with a positive Wassermann reaction.** *Jour. A. M. A.*, May 16, 1914.

185. RENTZ. **Choked disk.** *Klin. Monatsbl. f. Augenheilk.*, lii., p. 531.

186. TSCHIRKOWSKY. **Diseases of the optic nerve in multiple sclerosis.** *Zeitschrift f. Augenheilkunde*, xxxi., p. 451.

CALHOUN (182, **Pseudo-optic neuritis**) observed the case of a woman aged 43, who consulted him on account of severe headaches. The margins of the disks were blurred and obliterated by slight swelling. The vessels were normal, but lost in the swelling at the edge of the nerve. The fields were normal for form, but there were slight irregularities for colors. The Wassermann reaction was negative. An examination two years later disclosed no material change in the findings and the headaches had disappeared. ALLING.

RENTZ (185, **Choked disk**) discusses 220 cases of choked disk, neuritic atrophy, and optic neuritis. The ætiology in 180 cases of double choked disk was: cerebral tumor in 72.2%; cerebral syphilis in 10%; cerebral tuberculosis in 4.2%; deformity of the skull in 3.9%; hydrocephalus in 3.3%; abscess of the brain, chronic nephritis, anæmia, lead poisoning, and fracture of the base of the skull, each in 0.6%; cysticercus of the brain in 1.2%. In 18 monolateral choked disks it was cerebral tumor in 33%; tuberculosis of the brain, multiple sclerosis, chronic nephritis, and disease of the accessory sinuses, each in 0.06%; disease of the orbit in 0.48%. The situation of the cerebral tumor was located in thirty-two: the frontal lobes in six, the parietal lobes in one, the parietal lobe and pons in one, the central convolutions in four, the temporal lobes in three, the temporal and occipital lobes in one, the occipital lobes in two, the corpus callosum in one, the thalamus opticus in one, the third ventricle in two, the base of the brain in two, the hypophysis in one, the angle between the cerebellum and the pons in five, the cerebellum in two. In nine cases of monolateral choked disk autopsy showed the tumor to be on the same side in five, on the opposite side in four. The visual field in choked disk due to tumor was free in eight, the blind spot was enlarged in thirty-three, a central scotoma was present in one, a central scotoma and concentric contraction in one, concentric contraction in forty-three, partial peripheral contraction in twelve, and hemianopsia in nine.

TSCHIRKOWSKY (186, **Diseases of the optic nerve in multiple sclerosis**) had a case of multiple sclerosis that presented bilateral papillitis. He considers the cause of the œdema of the papilla to be an obstruction to the circulation of the blood and lymph by extensive sclerotic plates in both nerve trunks.

DUTOIT (183, **Neurotropic action of lipoiodine in optic neuritis**) recommends highly the use of lipoiodine for the treatment of any affection of the optic nerve or retina, no matter what its origin may be. Lipoiodine is an organic compound of iodine and is, according to the author, much superior in its action to the iodides commonly used, not only on account of its greater affinity for the nervous elements of the visual organ, especially the optic nerve and retina, but also because of its cumulative effect. In support of his assertions the author reports the histories of four patients with optic neuritis and partial atrophy in whom he obtained a marked improvement by the aid of lipoiodine. SCHOENBERG.

PRICE (184, **Tay-Sachs amaurotic idiocy**) thinks that the lack of certain knowledge regarding the ætiology of this disease, the varied opinions expressed, the character of the pathological findings, and the positive Wassermann in his case, should be sufficient ground to reopen the argument that hereditary syphilis is the cause. ALLING.

XXII.—ACCIDENTS, INJURIES, FOREIGN BODIES, PARASITES.

187. BAILLART. **Interstitial keratitis and traumatism.** *Annales d'ocul.*, cli., p. 452.

188. BALLANTYNE, A. J. **Alternating hyphæma: an unusual result of concussion of the eyeball.** *Ophthalmoscope*, June, 1914, p. 322.

189. Baudry. **Contribution to the medico-legal study of traumatic paralyses of the muscles of the eye.** *La clinique ophtalm.*, xx., p. 83.

190. Clegg, J. G. **A case of death following open evisceration.** *Ophthalmoscope*, June, 1914, p. 337.

191. Contino. **Injuries of the ciliary body. Clinical and pathological study.** *La clinica oculistico*, September–October, 1913.

192. Haas, E. **Action of a piece of indelible pencil on the conjunctiva and cornea.** *Arch. d'ophtalm.*, xxxiv., p. 299.

193. Leber. **Filarial diseases of the South Sea.** *Arch. f. Ophthalm.*, lxxxvii., 3, p. 541.

194. Marbaix. **Injuries of the eye during ball playing.** *La clinique ophtalm.*, xx., p. 285.

195. Maschler. **Shot wound of the sclera.** *Klin. Monatsbl. f. Augenheilk.*, March–April, p. 537.

196. Natanson. **Two cases of operation for cysticercus.** *Zeitschrift Augenheilkunde*, April–May, p. 454.

197. Pascheff, C. **The violet eye from chemical pencils.** *Ann. d'ocul.*, cli., p. 430.

198. Polliot, H. **An obstetrical enucleation.** *La clinique ophtalm.*, xx., p. 296.

199. Terrien, F., and Prelat, P. **A case of subconjunctival filaria loa.** *Arch. d'ophtalm.*, xxxiv., p. 294.

Polliot (198, **An obstetrical enucleation**) relates the unique case of a midwife who delivered a primipara of an infant with one eye enucleated. The accident was produced by persistent attempts on the part of the midwife to make sure whether it was a breech presentation, and by repeatedly introducing her index finger into the orbit of the infant under the impression that it was the anus. Schoenberg.

Haas (192, **Action of a piece of indelible pencil on the conjunctiva and cornea**) removed a piece of indelible pencil which got into the conjunctival sac of a young student two hours before, while he was sharpening the pencil. Three days after the accident a number of small ulcerations appeared on the margin of the cornea. The ulcerations repaired within twenty-four hours, but others appeared elsewhere, at the limbus. After a few days, several whitish lines appeared in the substantia propria of the cornea and lasted for about fifteen days, when they disappeared entirely. An intense photophobia persisted for about one month after the ulcerative process in the cornea had completely subsided. The severity of the process following the accident, apparently insignificant at beginning, should be a warning for the physician who has to give a certificate. The chemical examination of the piece of pencil showed it to consist of a vehicle, an inert substance (argillum), and a dye, rosaniline hexamethyl, which—as it is known—is a basic dye with great histologic affinity for the cellular nuclei. This sufficiently explains the necrotic action of the indelible pencil upon the external membranes of the eye of the author's patient. SCHOENBERG.

PASCHEFF (197, **The violet eye from chemical pencils**) reports the cases of two young patients with violet discoloration of the conjunctiva of one eye from the accidental introduction of a piece of violet pencil into the conjunctival sac. Washing out of the conjunctiva was sufficient to remove the stain in twenty-four hours. No ill after-effects were produced. SCHOENBERG.

BALLANTYNE (188, **Alternating hyphæma: an unusual result of concussion of the eyeball**) describes a case of trauma to the eye in which the blood in the anterior chamber disappeared on accommodation and returned, sometimes greater in amount, on relaxation of accommodation. The size of the hyphæma was unaltered by pressure on the eyeball. If the patient lay on the right or left side, the blood could be made to occupy the temporal or nasal angle of the anterior chamber, but on accommodation it always drifted towards the inferior angle Ballantyne is of the opinion that the ciliary body was separated from its scleral attachments at the inferior angle of the anterior chamber, thus allowing communication between the chamber and the suprachoroidal space, and that the alteration in size of the hyphæma was due to suction brought about by contraction of the ciliary muscle. CURRAN.

MARBAIX (194, **Injuries of the eye during ball playing**) has seen a number of traumatic lesions of the eye sustained by the Belgian college boys while playing ball. The most serious conditions were produced by balls that were so small that they struck the eye without hitting the margins of the orbit. He recommends that these balls be discarded in favor of larger ones. SCHOENBERG.

In order to establish a relation between a traumatism and an interstitial keratitis it is necessary, according to BAILLART (187, **Interstitial keratitis and traumatism**), that be the accident confirmed by an ophthalmologist, that a slight inflammatory irritation of the eye be present in the days following, and that after an interval of at least ten to fifteen days the keratitis appears in its characteristic way. Disease of the second eye excites doubt as to its traumatic character, but does not suffice to exclude it when both of the other conditions are fulfilled. In the appraisement of the indemnity the impairment of the second eye is to be excluded, as the condition is one of a general disease that has been localized by the injury. CAUSÉ.

BAUDRY (189, **Traumatic paralyses of the muscles of the eye**) describes first the pareses caused by fracture of the base of the skull, in which the ocular nerves are almost always involved because of their situation. As a rule they may be observed immediately after the accident, but they may appear later, and are then caused by the hemorrhage. Paresis of the abducens is the most common because of its exposed position on the apex of the petrous portion of the temporal bone, the favorite place for fractures of the base. Isolated nuclear paralyses of the externus are met with only exceptionally. Pareses of the oculomotorius from fracture of the anterior part of the base of the skull are more rare, and are generally complicated with changes in the optic nerve on account of the position of the two nerves. The complication of a total ophthalmoplegia with an arteriovenous aneurysm after rupture of the internal carotid into the cavernous sinus is characteristic. Traumatic pareses after wounds of the orbit or face, caused by traumatism to the nerves, muscles, or tendons, are more common than is generally thought. They may be produced directly by the penetration of an object into the orbital cavity, or indirectly by a contusion of the region of the orbit, with or without fracture of one of the bones. The oculomotor nerve is the one mostly affected, and one may often see partial pareses of single branches; total ophthalmoplegia is seen only exceptionally after very severe traumatisms, by which the eye is frequently sacrificed. The prognosis of pareses of the ocular muscles is generally good, except when they are caused by direct laceration, or meningeal inflammation. The indemnity should be calculated according to the paresis of the affected muscle and the occupation of the patient. Diplopia and loss of stereoscopic vision, with their accompanying symptoms, are as bad in certain callings, at least for a time, as the complete loss of an eye. Persistent diplopia may very often be compensated by the position of the head or by correction with prisms, yet even then there is always a certain amount of impairment of the wage-earning ability, which may be estimated at from 5 to 15%. The common traumatic mydriasis with paresis of the accommodation after contusions usually lasts a long time and is a particularly serious disturbance in occupations requiring hard near work, and may be estimated at from 10 to 15%. If it necessitates the exclusion of one eye the earning capacity is lessened 25 to 30%. CAUSÉ.

CONTINO (191, **Injuries of the ciliary body**) reports three cases of shot wound of the ciliary body. He says that in thirty-four cases observed by him the foreign body did not penetrate the eyeball in twenty-two, but did in twelve. Twenty-seven of the patients were adults, four of them women, seven were children. Injuries of the ciliary body without penetration are the more frequent among workmen and playing boys. The diagnosis is rarely difficult if one makes a careful examination of the seat of the injury, its form and direction, and ascertains whether there is an intraocular hemorrhage. If a foreign body penetrates the ciliary body and is invisible, its location may be determined by the tenderness on palpation of the injured region, and this means may be supplemented by the sideroscope and the X-rays. If an injury of the ciliary body is complicated by penetration, or the presence of a foreign body that cannot be removed, inflammation commonly appears which leads not only to loss of vision, but to loss of the eye itself with danger of sympathetic ophthalmia. Atrophy of a wounded eye is often the result of a wound of the ciliary body. If a plastic cyclitis sets in, phthisis bulbi will result. Sympathetic ophthalmia may be excited by any injury whatever of the ciliary body. If an eye that has become atrophic as the result of a wound becomes inflamed, a sympathetic inflammation may set in, no matter how long back the traumatism may date. The conditions productive of sympathetic ophthalmia appear with greater frequency in eyes that have suffered from penetrating wounds of the sclera and cornea with involvement of the iris and ciliary body, or the entrance of a foreign body. Contino is of the opinion that a primary healing of a wound of the ciliary body is impossible because of the gaping of its margins caused by the retraction of the ciliary muscle, as well as the participation of the vitreous and ciliary processes, and also because the reparative material is secreted only by the episclera while the ciliary epithelium of the retina is incapable of proliferation so as to cover the inner surface of the cicatrix. Treatment consists of suturing the margins of the wound in the conjunctiva after excising any prolapse of vitreous that may be present. When there is danger of a considerable escape of vitreous the sclera should be sutured. Any prolapse of iris or of the ciliary body should be abscised.

CALDERARO.

MASCHIER (195, **Shot wound**) saw a wound made by a bullet from a Flobert rifle that rebounded from its target. There was no wound of the upper lid, but one as large as a pea internal to the limbus, a large intraocular hemorrhage, and good tension of the eye. The bullet lay behind the orbit in the middle fossa of the skull, having passed probably through the superior orbital fissure.

TERRIEN and PRELAT (199, **A case of filaria loa**) report a case of filaria found under the conjunctiva of one eye. The patient had lived for ten years in Congo and had felt several times that something was moving about in his eyeball. The examination of his eye revealed a subconjunctival cyst in which a little worm could be seen moving. Prof. Blanchard examined it and pronounced it as a filaria loa. The manner of entrance is not known. The authors think that the parasite may be introduced into the system by the bite of a fly, glossina palpalis, frequently met with in Africa.

SCHOENBERG.

LEBER (193, **Filarial diseases**) says that diseases due to different kinds of filaria are common in Samoa. In the eyes, microfilaria are mostly found. They occur mainly in the lids, or in the conjunctiva, where they cause œdema and inflammation that last for a few days. The occurrence of filaria inside of the eyeball is more important. They are found in the vessels of the retina and of the choroid, where they obstruct the entire vessel. The consequence for the vision depends on their location. Hemorrhages are frequent.

SCHIRMER.

NATANSON (196, **Cysticercus**) reports two cases of cysticercus removed through a horizontal incision in the sclera. One was subretinal in the region of the macula, the other outward from the macula.

CLEGG (190, **Death after evisceration**) reports a case in which open evisceration was selected as the safest method in a case of panophthalmitis. The patient died, and autopsy showed that the infection reached the meninges through the optic nerve and produced a purulent meningitis.

CURRAN.

BOOK REVIEWS.

I.—JESS. **Die sympatische Ophthalmie.** (Sympathetic Ophthalmia.) Sammlung zwangloser Abhandlungen aus dem Gebiete der Augenheilkunde. Halle a. S. 1914.

Jess gives a comprehensive report on our present knowledge of sympathetic ophthalmia. This disease since it was first described by Mackenzie in 1835 has attracted the keen interest of a great number of oculists. Its origin, however, is still in the dark, and its therapy is unsatisfactory notwithstanding the painstaking work of a great number of scientists.

The first thirteen pages of Jess's booklet are devoted to the description of the various forms of the clinical appearance of this disease. The author follows closely the description which Schirmer gave eighteen years ago in the Handbuch of Graefe-Saemisch.

We have to differentiate absolutely between sympathetic irritation and sympathetic inflammation. The old idea that the former is a preliminary stage of the latter is entirely erroneous. The clinical picture of sympathetic irritation is very manifold. It consists in an abnormal irritability of the sympathizing eye, combined with lowered efficiency, and is caused, according to general opinion, by irritation of the centripetal nerves of the exciting eye which is transmitted to the nervous apparatus of the sympathizing eye.

Two points are essential for the diagnosis of sympathetic irritation: the second eye must not show any anatomical changes except for a slight conjunctival or episcleral hyperæmia; and the enucleation of the exciting eye must cure the affection of the other eye entirely and instantaneously.

Sympathetic irritation may consist of pain in the second eye or in the head on the non-affected side. Strong light is especially liable to produce this symptom, as photophobia is one of the most frequent symptoms.

Many cases of amblyopia sympathica have been described; very few, however, deserve this name. Some of them were due to retrobulbar optic-nerve affections, little known in former times; in other cases the amblyopia was simulated. Much more frequent is the asthenopia sympathica, *i.e.*, diminished endurance of the eye when the patients try to read or to work; this may be caused by a weakened condition of the retina—asthenopia retinalis—or of the ciliary muscle—asthenopia accommodativa. The symptoms are exactly the same as are found sometimes in both normal eyes of a neurasthenic patient. The secretory apparatus may become involved by hypersecretion of the lacrimal gland. A sympathetic glaucoma, however, due to intraocular hypersecretion does not exist.

This sympathetic irritation can be caused not only by serious inflammation of the eye; every slight injury to the cornea, foreign body in the conjunctival sac, in short, every affection that irritates the sensitive ciliary nerves, is capable of producing irritation in the second eye.

Recovery or enucleation of the exciting eye cures the sympathetic irritation with certainty and instantaneously.

Sympathetic inflammation is characterized by the presence of organic changes in the tissues of the eyeball, mostly in the uvea. It is not influenced by the removal of the exciting eye. It occurs after injuries or operations of one eye which do not heal normally but are followed by a chronic iridocyclitis. In exceptional cases intraocular tumors may produce sympathetic inflammation.

Sympathetic papillo-retinitis has been described by Schirmer as a true sympathetic inflammation. It resembles however sympathetic irritation, in as much as it is cured with certainty by the enucleation of the injured eye. It is probably due to the action of toxins produced by the microörganisms in the first eye.

The anatomical changes differ entirely from those found in purulent inflammation. Fuchs claims that they are so characteristic as to permit the diagnosis of its sympathetic nature.

In regard to the etiology our uncertainty has grown in recent years. Ten years ago it seemed to be a well-established fact that sympathetic ophthalmia was caused by microorganisms which migrate from the exciting to the sympathizing eye. This belief was not shaken by the fact that all endeavors to find this microörganism have failed.

There are other diseases of a doubtless microbic origin where the microörganism can not be demonstrated. This gap has not been filled in recent years. Deutschmann claims to have found a diplococcus in the exciting eyes and to have produced uveitis experimentally with the same. It appears doubtful, however, whether these results are reliable or are due to faulty technique.

Lately Elschnig has published a series of articles in order to prove the anaphylactic origin of sympathetic inflammation. He assumes that the absorption of injured uveal tissue of the first eye sensitizes the organism and especially the homologous organ, the other uvea. In this sensitized tissue the entrance of the anaphylactic substance, uvea in small quantity, will produce severe inflammation. The decay of even one uveal cell in the second eye will be capable of producing sympathetic inflammation. It seemed necessary to Elschnig, in order to explain the decay of uveal cells in the second eye, to form a second hypothesis. He assumes that there must be some physical anomaly or autointoxication to bring about the first changes in the uvea of the second eye.

This theory suggests somewhat Schmidt-Rimpler's modified ciliary-nerve theory. It explains some of the clinical facts better than the old theories; there are quite some difficulties left.

Elschnig has succeeded in sensitizing the organism from the eye and in producing anaphylactic uveitis by reinjection into the same eye. He could not produce an inflammation of the second eye by these means. It has been proven furthermore by several authors that the microscopical pictures in sympathetic and in anaphylactic uveitis are different.

It is impossible therefore to accept Elschnig's hypothesis of the anaphylactic nature of the sympathetic ophthalmia as a well-established theory. SCHIRMER.

II.—**Die Anaphylaxie in der Augenheilkunde.** (Anaphylaxis in Ophthalmology.) By Prof. Dr. AUREL v. SZILY (Freiburg i.

Br.) and Dr. U. ARISAWA (Osaka), experimental collaborator. With 4 illustrations, 10 colored and 3 not colored plates. Preface by Professor Dr. TH. AXENFELD (Freiburg i. Br.), pp. 317. Stuttgart: FERDINAND ENCKE, 1914.

The question of anaphylaxis has, during the past few years, attracted the close attention of physiologists and clinicians alike, and a considerable number of papers on experimental researches and clinical observations has been published in various countries. Anaphylaxis has been recognized as a truth of a broad and general meaning, interesting every branch and specialty of medical science.

Among others, ophthalmologists were not tardy to recognize the great importance the theory of anaphylaxis may have upon their own special field, and during the last three to four years numerous attempts have been made to bring forth experimental and clinical proofs regarding the relation between general and ocular anaphylaxis. These papers have appeared, scattered in various medical journals, and Professor v. Szily, one of the foremost workers in this field, has had the happy idea of issuing in book form the results of his own arduous and extensive investigations, as well of all other authors. The book should be read by every progressive ophthalmologist. It contains a wealth of material, even the outlines of which could not be reproduced in the space allotted to this review. It is not our intention to summarize the hundreds of experiments upon which are based the principles and conclusions enunciated in this monograph. We shall only make a short mention of the most salient points.

The book is divided in two, a general and a special part. In the first part, the author gives in 58 pages, the history, definition, and the fundamental principles of anaphylaxis and the technical procedures used by various authors for their experimental work. The ground is pretty well covered, and the reader who intends to familiarize himself with the general principles of anaphylaxis can nowhere read a better exposition.

From the reviewer's point of view and, strange to say, one of the debatable points in the first part of the monograph, is the definition of anaphylaxis. v. Szily's definition of anaphylaxis is as follows: A condition in which an organism has become hypersensitive to an antigen with which it has been previously treated. A certain time (period of incubation) must elapse before the organism becomes hypersensitive. No lesser authorities than v. Pirquet and Schieck, who use the term of "Allergie" instead of anaphylaxis, give a similar hazy, though broader definition of this condition. It would have been much better if Ch. Richet's original conception could have been adopted and possibly amplified in v. Szily's excellent work.

Anaphylaxis is not a state of hypersensibility or of increased ability to react to albumin foreign to the organism, as so many authors believe, but it is the well-defined clinical condition which results when an organism is repeatedly submitted to the action of a foreign albumin. It is not a latent or potential state, as the word "hypersensitiveness" implies; it is a symptom complex, or rather a disease, and it is important for the reader to have a clear idea of the meaning of anaphylaxis before he goes any further.

v. Szily's description of the two types of anaphylactic reaction, the general and local anaphylaxis, is complete and very accurate. Of these two types, the local anaphylaxis, or phenomenon of Arthus, is the one of great interest to ophthalmologists. Horse serum injected a few times at regular intervals under the skin of a rabbit will be promptly absorbed. After the 6th or 7th injection, it will produce a severe inflammation and abscess. A similar local reaction is noticed when horse serum is repeatedly injected into the parenchyma of the cornea of a rabbit. These are instances of local anaphylaxis, and the discovery of this type of reaction has served as foundation to the research work which has been done on ocular anaphylaxis. It has opened up a field full of possibilities and has thrown a new light on such problems as sympathetic ophthalmia and parenchymatous keratitis.

Further on, the author describes in detail, the methods and substances used for sensitization, the period of incubation, and the various results obtainable in various species of animals. The minute description of the methods of obtaining extracts of the various tissues of the eyeball, with their antigenic and toxic effects occupies an important part of an entire chapter on antigens. The introduction of an antigen into the body, parenterally,—that means not by the digestive route—provokes the production of antibodies. v. Szily discusses the various theories advanced for the explanation of the production of anaphylaxis and leans toward Friedberger's theory that it is due to the action of a substance resulting from the combination in the organism of the antigen, antibody, and complement. Vaughan's theory on anaphylaxis is not discussed, but Schittenhelm's interpretation of this condition by Abderhalden's defense-ferment ("Abwehr-fermente") theory is given more than due consideration.

After the pure theoretical part, v. Szily describes the symptomatology of anaphylactic shock and the post-mortem findings in guinea-pigs and rabbits and reproduces the views of v. Pirquet and Schieck on manifestations of general anaphylaxis (exanthem and fever) in human beings.

Referring to the important work of Friedberger and his coworkers, the author goes elaborately into the discussion of the intimate relation between the evolution of infectious diseases, immunity and anaphylaxis. He expresses his adherence to the generally accepted idea that bacteria act upon the organism, not only by their toxins, but also by the antigenic action of their own dead bodies which, under certain circumstances, may produce anaphylaxis.

The reader will realize how interesting this part must be to the ophthalmologist, who has frequently to contend with recurrent infectious processes in the eye. These recurrences may be explained by an anaphylactic condition of certain tissues in this organ.

The second chapter deals with the technic of injections in the eyeball (cornea, anterior chambers, and vitreous), the method of obtaining anaphylatoxins, and of making various organ emulsions and extracts, the Weichard's epiphanin reaction and Abderhalden's test, and their application to the detection of anaphylatoxins in the blood and tissues.

The special part of the monograph contains the study of anaphylaxis in relation to ophthalmology. v. Szily devotes a good deal of space to the question regarding the existence of anaphylactic conditions in the eye and builds up the foundation to this problem by a very extensive critical review of all that has been published on the subject. After he discusses the studies on the toxicity of extracts from various organs of the animal body, and especially from the various parts of the eye (cornea, ciliary body, lens, retina, vitreous), he reproduces in detail all the experimental work of Uhlenhut, Kraus, Dörr, Krusius, Römer, Gebb, and many others on the production of general and ocular anaphylaxis by the use of extracts from tissues of the eyeball. Among the various parts of the eye, the lens has been more extensively used as an antigen and for the production of anaphylaxis. A very interesting and far-reaching point brought out by these workers was, that the lens matter possesses an entirely different kind of antigenic specificity than the blood serum. Experiments have shown that anaphylaxis may be produced by using lenses from one species for the first injection and from a different species for the subsequent injections, while, on the other hand, when serum is utilized for the production of anaphylaxis, it must always be from the same species. The lens matter is called "Organ specifisch," while the serum is "Art specifisch" (species-specific). Krusius believes to have discovered anaphylactic symptoms in an animal by first doing a discission of the lens in one eye and then, after a certain time, in the other eye. The reader will realize the possible importance of the question involved. If it is possible that lens matter, which remains after a cataract operation, acts like an antigen and sensitizes the body against its own lens matter, then it is equally possible that the absorption of lens matter after the second cataract operation produces anaphylactic symptoms in human beings. So far, Krusius' work has been contradicted by the findings of a number of other workers. Neither does our clinical experience speak in favor of such a theory.

After this preliminary study of the toxicity and antigenic qualities of organ extracts, the author enters into the discussion of local anaphylaxis in the eye. Repeated injections of a foreign albumin in the cornea, vitreous, under the conjunctiva, etc., produce, besides general anaphylaxis, local disturbance of an anaphylactic nature. Various serums, organ extracts, and also extracts from various tissues of the eyes, mainly uvea, cornea, vitreous, retina, have been used as antigens, in all possible combinations. The antigen was first injected into the peritoneum, the blood, or subcutaneously, and then, after the usual period of incubation, into the eyes, or *vice versa*, or both injections were made in the eyes. The account of a very long series of experiments along this line concludes that the eye may react in a manner characteristic of local anaphylaxis when it has been sensitized by repeated local or distant application of an antigen. It is to the credit of the author that Wessely's pioneer work on corneal anaphylaxis with the classical drawings illustrating the subject are faithfully reproduced.

One of the most interesting chapters in v. Szily's monograph is undoubtedly Chapter 9, dealing with the conception of sympathetic ophthalmia as an anaphylactic uveitis. This question is the logical outcome of the numerous researches, painstakingly and carefully laid out in the previous eight chapters of the monograph.

The author superfluously, but very ably, reviews the various theories on sympathetic ophthalmia advanced until the anaphylactic era and finally gives a summary of the views of Elschnig and Kümmel on this subject. These authors have lately done a great deal of experimental work on ocular anaphylaxis and have put forward a number of experimental and clinical "proofs" tending to show that sympathetic ophthalmia is due to an anaphylactic reaction in the uvea of both eyes. According to these authors, the uveal pigment enters the circulation, under certain circumstances (injury, disease) and sensitizes the uvea of both eyes. They also add that a preexisting disturbance of the general nutrition is necessary so that the uvea should be in a receptive mood for hypersensitization. The reaction after this repeated sensitization by the uveal pigment is an anaphylactic phenomenon and constitutes sympathetic ophthalmia.

v. Szily reviews the researches of Weichardt, Wissman, Gradle, which seem to support Elschnig's theory, and those of Hess, Roemer, Meller, Fuchs Jr., Dold, Rados, v. Hippel. and Brock, which bring forward serious objections based on experimental as well as on clinical data. The discussion of the entire subject, in view of the heated opposition Elschnig's views have encountered, is fair, impartial, and very instructive. Of equal merit is the author's exposition of the conception of parenchymatous keratitis as an anaphylactic condition. Since Wessely has been able to reproduce in rabbits, by the anaphylactic method, a condition in appearance very much similar to the human parenchymatous keratitis, the term anaphylaxis has frequently been used in the discussion on the nature of this disease. v. Szily and Arisawa have verified by numerous experiments all the findings of Wessely. On the strength of these experiments and considering the clinical evolution of parenchymatous keratitis, Elschnig and Igersheimer have come to the conclusion that this disease is of anaphylactic nature, produced by the repeated sensitization of the cornea by the products of metabolism of the spirocheta pallida.

Finally the author reviews Römer's theory of the etiology of senile cataract. The nucleus of this theory is that there must be in the organism and mostly in the blood of cataract patients substances which act injuriously on their lens. Römer has tried all methods of examination he could think of to prove the existence of these lens-injuring substances. Among other methods, Römer and Gebb used anaphylaxis and found that blood serum from cataract patients, mixed with lens albumin and injected repeatedly into guinea-pigs, produces a typical anaphylactic drop in the temperature of the animal in about 30% of the number of animals tested. This conclusion could not be confirmed by v. Szily, who made numerous experiments and obtained only negative results.

Römer also believes to have detected by Abderhalden's method the possible presence of specific ferments in the serum of cataract patients. Neither could this work be confirmed by v. Hippel's thorough researches.

We shall only mention the interesting chapter on hypersensibility to drugs, which in the opinion of the reviewer has nothing to do with anaphylaxis, and we pass to the last chapter on the pathological anatomy of anaphylaxis in inflammations of the eye.

This painstaking and interesting piece of work has been done by v. Szily in collaboration with Arisawa. They give detailed descriptions and illustrations of the microscopical and stained microscopical specimens of eyes with "anaphylactic keratitis" and "ophthalmia anaphylactica."

They describe three types of anaphylactic reaction in the cornea: parenchymatous, ulcerous, and necrotic.

Their description of the microscopic findings in parenchymatous keratitis has many points in common with that given by Elschnig of human corneæ with parenchymatous keratitis.

The anaphylactic reaction obtained in eyes of rabbits by the injection of extracts from uvea and lens matter into the vitreous is termed ophthalmia anaphylactica. They give a detailed description of the changes in such eyes at various stages and find much similarity with the picture of sympathetic ophthalmia. On the other hand, some of the most characteristic points of sympathetic ophthalmia are missing, and the authors justly refrain from confusing one condition with another. Apart from its scientific value the reviewer regards v. Szily's monograph as a document of great medico-historical interest. It illustrates how much preliminary work had to be done in order to make a path for the study of this intricate problem, and how progress makes its way from indefinite and hazy ideas to carefully laid-out researches. It is inspiring to see tireless attempts following one another in order to work out the great variety of problems involved in the study of anaphylaxis.

The author should be congratulated upon the way he has succeeded in making a more or less dry and complicated subject intensely interesting and easily readable. Occasional repetitions of the same kind of experiments, a tendency to theorize even when it could be avoided, and discussions on subjects not directly related to anaphylaxis are small errors upon which there is no necessity to insist.

SCHOENBERG.

III.—**Die Etiologie des Trachoms.** (Etiology of Trachoma.) By Prof. TH. AXENFELD, Freiburg, pp. 192. Published by FISCHER, Jena, 1914. Price 10 Marks.

The problem often apparently solved in the past is in reality to-day more confused than ever. The author attacks it from one angle only—that of a microbic causation. Does the affection represent a reaction toward a number of different irritants? Is trachoma a clinical unity? or is it merely a group disease? There is no doubt that certain mixed infections of the conjunctiva can set up a clinically perfect "trachoma." In such cases we may find gonococci, but much the most important factor is admixture with one or more other familiar causes of conjunctivitis. Nevertheless, not one of these germs is known to be able outright to produce complete trachoma. At most where the latter is endemic such germs may cause suspicious cases.

Is there a pure acute trachoma of clinical significance? This point can be settled by inoculation or by study of fresh conjunctival catarrhs which become trachomatous. The acute case as a rule is due to mixture of infection and is rather rare. On the other hand, the so-called acute trachoma of the newly born child is very common, and it is in this form that the incidence of the "inclusion bodies" has been chiefly studied. These bodies will be taken up later. In regard to inoculation trachoma, the chief mystery relates to the frequent negative results. This subject has taken a great deal of explanation, and the main difference of opinion is whether the secretion or the solid fragments of tissue convey the disease. Trachoma is not nearly so contagious as Koch–Weeks or diplobacillus conjunctivitis. The problem is, then, Do the follicles of trachoma contain the contagion, and is trachoma a disease which may not involve a folliculosis? Granting that follicles are invariably present in inoculable trachoma, do these exhibit any special type? Again is there a follicular trachoma which is not contagious?

These problems have been studied extensively and appear to be very difficult of solution. Granular trachoma may occur in every degree of severity, affecting on the one hand the size and number of the granules, and on the other the degree of inflammation present. The cure of the affection may also show great variability.

Is it ever benign? Research evidently points throughout to the question of an "inclusion body" on the one hand (which can behave in various ways) and clinical trachoma on the other. The study of either may be pursued indefinitely, without any semblance of parallelism. On the other hand there is abundant reason to believe that these bodies stand in some relationship to the contagion of trachoma. The subject may now be changed to that of the natural and acquired immunity to trachoma as first shown by Swan Burnett in connection with negroes, who show some immunity; while the American Indians exhibit notable predisposition. Among animals apes are readily inoculated, in comparison with many other species. These cases have relative significance only, and the immunity or susceptibility is doubtless due largely to secondary factors. The author does not believe in an essential immunity. The secondary influences, which are numerous, need not be cited. here; of special interest, however, is one-sided trachoma, in which we have to admit immunity for the other eye. Does an eye which has recovered from trachoma possess acquired immunity? This question is at present unanswerable, as a new infection might be a relapse. Many experiments have been made to determine whether general immunity can be conferred, with a view to successful serotherapy. Thus far little progress has been made.

The study of artificial or inoculation trachoma in animals has resulted in a very large literature, involving both the discharge and trachomatous tissue. The large anthropoids, which come nearest to man, sometimes give negative results. Again, in some experiments a mild, short-lived atypical trachoma has resulted. Ordinary laboratory animals are said to be quite immune. The lower apes show most conflicting results. Evidently all must depend on quality of matter inoculated, technique of inoculation, protection of conjunctiva after inoculation, and various minor factors. The lesions produced in positive results also show notable variations. For example, even the higher apes, the lesions produced are very mild in character, often without production of follicles. All cases readily healed without scar formation save one (case of Boening) and without pannus. However not enough attention has been paid to the possibility of microscopic scars. In any case we cannot escape the conclusion that the inoculation trachoma of the ape is a true trachoma. Thus the inoculation period is the same (seven to ten days), the histological picture is the same, in the ape trachoma and the mild cases in man. The so-called "inclusion bodies" have sometimes been seen in ape trachoma.

Naturally attempts have been made to produce a nonfiltrable trachoma virus. Some notably positive results have been published, in which a most intensive technique was used, but the majority of experiments gave negative results. Some of the positive results were obtained with the conjunctival scrapings of a so-called "inclusion blennorrhea" (thus far the author has as far as possible avoided this topic because it is considered very fully later).

He now takes up the Prowazek bodies, which he terms briefly "P. K." Prowazek, not an ordinary bacteriologist but a special student like Schaudinn of protozoa, entered the trachoma field in 1907 simply as a zoölogist. The so-called—by him—epithelial inclusions found in trachoma discharges have been named in his honor "P. K." (Prowazekche Körperchen).

After a probationary period Prowazek's findings were accepted by ophthalmologists as something to be reckoned with. The bodies were soon recognized in all parts of the world. The general finding was that P. K. are not invariably present in trachoma, while exceptionally they are to be recognized in blennorrhea neonatorum whether or not due to gonococcus. They were also found in the genital discharges, and clinical trachoma was set up in an ape from a human vaginal discharge. It was not shown whether the P. K. were themselves parasites.

P. K. have been found a few times in the seemingly normal conjunctiva. They also occur at times in non-gonococcic blennorrhea neonatorum. In the absence of other germ, it is proper to speak of an "inclusion blennorrhea," as a disease entity. Do the P. K. occur in the conjunctiva under conditions other than trachoma and ophthalmia neonatorum? Findings differ extremely, but if we go by positive results they may occur exceptionally in almost any form of acute and chronic conjunctivitis; spring catarrh and diplobacillus conjunctivitis are especially mentioned in this connection.

Leber and Prowazek have described a specific condition alleged to be due to the P. K., namely "epitheliosis desquamativa conjunctivæ." This has been regarded by some as an acute trachoma. The P. K. have also been suggested as the cause of swimming-bath conjunctivitis, ordinary granular lids, contagious vaginitis in animals (cows), etc.

As to the relative frequency of P. K. the consensus of statistics shows that they are more common in fresh, secreting cases of trachoma, and almost absent in the very late, cicatricial stage. Dividing all material into fresh and old cases, the percentages appear to be 52% in recent and 12% in old cases.

Hence about 36% show the P. K. It must be borne in mind that recent and old cases are sometimes very difficult to distinguish, and that numerous statistics do not include "scar" cases. There is much variability connected with country, race, etc.

P. K. have been found in trachomatous pannus (their occurrence in the cornea in pannus is doubtful). They do not occur in the inflamed lacrimal sac but have been seen in the secretion.

In regard to the morphology, cultural and tinctorial qualities of the P. K., these have all been worked out by Prowazek, Halberstädter, and others, but their nature is still unknown They lie beside the nucleus in the epithelial cell. Certain authors regard them as products of diseased epithelia. In any case the epithelia which contain them are diseased. One school of observers insists that the P. K. penetrate into normal cells and disorganize them, while another holds that the P. K. are secondary parasites and appear only after the epithelia have become diseased from other causes. The P. K. occur in greatest abundance in the conjunctival folds.

In the study of the P. K. their appearance in sections must be compared with that in smears. Most of the work has been done with smears. Lindner having called attention to differences which prevail between the two, the author was moved to study thoroughly section preparations.

Lindner has called attention to certain "free initial bodies" in smears which may or may not represent a form of P. K. These have been termed I. K. (Initial Körperchen) and it is assumed in some quarters the P. K. are preceded by the I. K. or at least appear simultaneously. The free I. K. resemble cocci, in part diplococci. They are occasionally seen in sections and have been regarded by some as the true parasitic cause of the disease.

It is self-evident that if the P. K. excite trachoma they must be present in the follicles. There has been much argument over various findings, but while technical devices have seemed to prove this presence, the weight of conflicting evidence must leave the question undecided.

The author's studies have satisfied him that the P. K. in the secretions agree in every way with those in the sections.

Are P. K. cell products? Are they artefacts? Are they altered nuclei? Do they arise from the cell protoplasm? Do they represent a mucin degeneration? Not one of these questions can be answered in the affirmative with certainty. In some cases negative conclusions seem quite justified.

This leads up to the parasitic theory. There the testimony of the zoölogist should be of paramount value. The resemblance between the P. K. and certain findings in the pocks of the variola is remarkable. Döflein, the prominent protozoölogist, examined the author's smears and sections and said that nothing but the culture test was needed to show that the P. K. were living organisms. Prowazek believes that some of his experiments on the orang proved the same thing. The existence of the initial bodies (I. K.) suggests the view of a mutation. The same double formation is seen in variolous matter (Guarnieri's bodies and fine punctate bodies some of which pass through a Berkfeld filter).

On the other hand, Halberstädter and Lindner state that cytology ignores the existence of the P. K.; the latter cannot be a unicellular organism. Can the P. K. be the exciting cause of trachoma? or are they "companion parasites"? Much may be said *pro* and *con;* some observers have their own views; there is no general consensus of opinion. The Vienna ophthalmologists once represented the view that gonorrhea neonatorum was the cause of trachoma, the latter being only a chronic gonorrheal conjunctivitis. This was before Neisser discovered the gonococcus, but even in the latter's absence this single viewpoint seems disproven. However, very serious attempts by Herzog and others have recently been made to reopen this question, even to the extent of claiming a mutation between the P. K. and gonococcus.

The "identity" theory of Herzog and others and the arguments advanced against it need not be repeated here; for the author, while greatly commending Herzog's work, concludes without hesitation that the P. K. cannot be derived from the gonococcus nor from any other form of microörganism. Whether the gonococcus can cause clinical trachoma is of course another matter. Gorbunow claims that he can cure trachoma with gonococcus vaccine, but claims of this sort have not been confirmed.

A special problem is relationship between inclusion blennorrhea of the newly born and trachoma of the adult. Naturally cases in which gonococci are present cannot be used for research. Inclusion blennorrhea has been described as occurring in the vagina near the rim, from which locality it has been transmitted to the conjunctiva of the ape. There are numerous forms of inclusion blennorrhea in which the P. K. occur. The author devotes much space to the clinical phenomena of inclusion blennorrhea. It begins as an acute process. In comparison with gonorrhea it is less violent, although otherwise resembling it. Unlike gonorrhea it passes into a trachoma-like condition, which, however, is mild and transitory. In nearly half the cases it is unilateral. After recovery P. K. often remain in the conjunctiva. Are trachoma and inclusion blennorrhea one and the same disease? Inoculation of one does not immunize against the other. However the consensus of opinion and the author's own views justify the belief that the P. K. of inclusion blennorrhea can cause clinical trachoma. Such cases may appear sporadically in trachoma-free countries without known exposure. There epidemic trachoma always spreads as such.

Recently Meyerhof of Cairo saw in young infants (up to three weeks old), during 1909–1913, four or five cases of inclusion blennorrhea and none of trachoma. He has never seen the latter develop before the fourth month. Noguchi and Cohen, after having reported on the absence of P. K. in gonorrheal ophthalmia in the newly born and adults, discovered both P. K. and gonococci in abundance in 29 out of 30 infants involved in an epidemic of blennorrhea. In common with others they also refuted the claim of Williams and others that the P. K. represent mutation forms of virulent bacteria.

Noguchi and Cohen also noted the transmission of inclusion blennorrhea from an infant to the mother. Other studies by these authors seem to show that among the same material genuine trachoma, inclusion blennorrhea, and gonococcic conjunctivitis may exist side by side. Cohen also followed up the inclusion blennorrhea epidemic above mentioned and was able to show that sequelæ of trachoma never developed.

Many pages are devoted to culture experiments with

P. K. It is not yet decided whether these are parasites; if they prove to be so it remains to be shown that they cause trachoma.

This investigation should be continued. An important point to determine is whether or not the real virus can be filtered. We have some positive findings to that effect; enough, the author believes, to settle the question permanently. The recent work of Gebb in this direction is mentioned.

Noguchi's experiments in culture attempts are mentioned as of special importance. He succeeded in causing the growth of certain organisms resembling the so-called I. K.; no P. K. were found. He regards the I. K. as the parasites. The author caused these experiments to be repeated with partial success, but could not obtain a pure culture. Thus far no positive inoculations have been reported.

The author devotes several pages to protozoa findings by Czaplewski, cell studies by Junius, and blastomycetic findings. These are in opposition to the work of Prowazek, and the author does not believe that they have seriously disturbed the findings and conclusions of the latter.

Extracts from conclusions not emphasized in the abstract:

Experimental trachoma is "acute" in many cases because of the artificial conditions of inoculation.

Germ-free trachomatous matter and secretion are transmissible, but not always contagious.

Trachoma without follicles is unknown in man.

Unilateral trachoma need not mean local immunity.

Trachoma virus shows little resistance to heat, etc.

The genital P. K. virus can cause an inclusion blennorrhea of the newly born which clinically is indistinguishable from trachoma, but runs a benign course.

Filtrates of both viruses are inoculable. This is not the case with any other eye microörganisms.

The two viruses may cause the same lesions in the ape. In both cases the so-called I. K. may be responsible.

P. K. occur in diseased cells but also in normal cells; some cells seem tolerant of their presence, others less so. They are probably exciters of disease.

In free secretion the I. K. possess significance, for P. K. may be absent.

If P. K. are parasites, I. K. doubtless represent a phase of them.

There may be two kinds of P. K. having the same morphology. P. K. are non-specific, and many solid arguments show that they may not be the essential cause of trachoma, although it is very likely that they are the determining cause and perhaps contain the parasite.

The evidence that P. K. cause inclusion blennorrhea of the newly born is much stronger than that concerning trachoma. P. K. are present in abundance in secretions, and are readily recognized by Gram's staining.

P. K. can therefore be held wholly responsible for a special form of conjunctivitis.

The genito-urinary men and gynecologists should study P. K. disease of the genitals.

The solution of the trachoma problem must be found in further study of the Prowazek bodies.

M. COHEN.

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ARCHIVES OF OPHTHALMOLOGY.

A CONTRIBUTION TO THE STUDY OF BITEMPORAL HEMIANOPSIA WITH NEW INSTRUMENTS AND METHODS FOR DETECTING SLIGHT CHANGES.[1]

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(*With five figures on Text-Plates Nos. VIII. to XII. and also twelve illustrations in the text.*)

INTRODUCTORY.

THE keynote of all the work herein presented and which should be especially emphasized is found in the statement that *a field examination with only one size of disk is just as incomplete as a visual examination with one size of letter.* In other words were it recorded merely that a patient could or could not see a $\frac{20}{50}$ letter, we would know about as much concerning the patient's central vision as we would about his peripheral vision if it were only recorded between what points he could or could not see the movement of a single disk. In each case the functional ability of certain regions of the retina would have been tested with respect to only one visual angle, whereas a series of visual angles should have been used to make the examination complete.

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[1] From the surgical clinic of Prof. Harvey Cushing at the Peter Bent Brigham Hospital, Harvard Medical School.

Presented in part at Section on Ophthalmology, A. M. A., San Francisco, June, 1915.

When a field is taken with a single size of disk it is usually the ½*cm* or 5*mm* disk, and this size has been so generally used that it has become known as the *normal disk.* This size, being as nearly standard as anything in perimetry, offers a good starting point for a series of disks ranging both above and below 5*mm* in diameter.

The use of a smaller visual angle than that obtained by the normal disk on the perimeter has been advocated by several observers since its original suggestion by Bjerrum. Bjerrum's method is of great value when the field shows little or no change to the normal disk. This subject will be taken up in the latter half of this paper, but first we wish to consider the examination of the visual areas found to be defective to the normal disk. Concerning this phase we have found no reports on the consistent use of a series of disks considerably larger than normal, indeed it has been stated that such an examination is not worth while.

EXAMINATION OF AREAS DEFECTIVE TO THE NORMAL DISK.

In a previous communication we described the instruments and method of such an examination in cases where defects were found in the field with respect to the normal disk and mentioned that a series of disks would be presented later. At that time the disks were recorded in terms of circular areas. While that system has its advantages, the numbers become so awkward, especially for the smaller disks, that they are difficult to record and remember. Accordingly in order to have a simple series no more numerous than necessary for all cases we used a factor of two on the diameter of the normal 5*mm* disk and continued above and below until we had a series of nine disks which have proven by experience to give satisfactory results in our method. (*Cf*. Fig. 7.)

When a field has been taken with the normal disks and shows marked changes quite sufficient for a diagnosis there seems to be a decided tendency to go no further, possibly because of labor involved or because there seems little more to be learned. As a matter of fact there is often much more to be learned though the information obtained throws more light on the prognosis than on the diagnosis. Thus the study of the defec-

ILLUSTRATING DR. WALKER'S ARTICLE ON "A CONTRIBUTION TO THE STUDY OF BITEMPORAL HEMIANOPSIA WITH NEW INSTRUMENTS AND METHODS FOR DETECTING SLIGHT CHANGES."

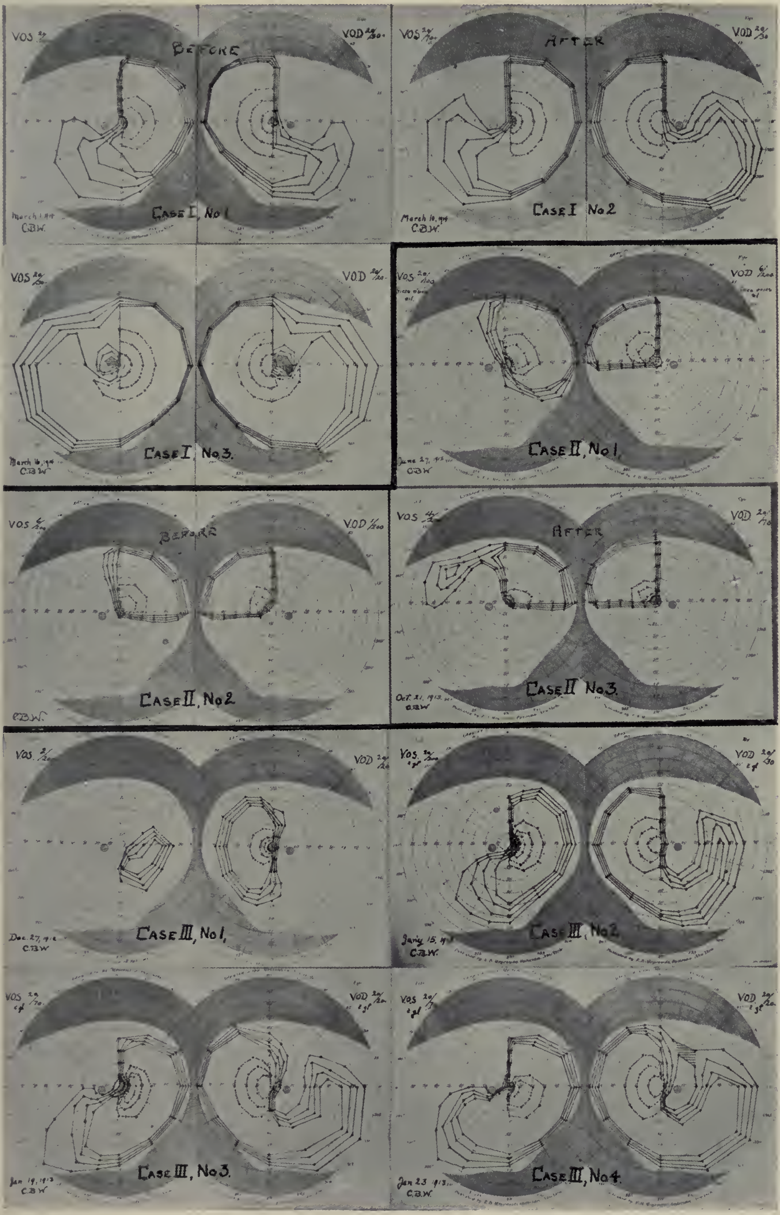

FIG. 1

tive retinal areas with a series of large disks is of more decided value in rather advanced cases which are to be carefully watched before and after operation. In this stage the small or normal disks may show very little change, although active changes may be going on in those parts of the retina found to be defective to the normal disk, both before and especially after operation.

In cases of homonymous hemianopsia of posterior origin, the line of cleavage between the seeing and the blind field is prone to show what we call *no response to large disks.* That is to say, the large disks are detected as their rim barely projects into the seeing field, and since we measure from the center of the disk the corresponding visual peripheries will lie very close together, so that the interval between them merely represents the length of their respective radii. On the other hand, in anterior lesions commonly *response to large disks is present*, as we are pleased to say. That is, the distance between the peripheries for various disks increases beyond that represented by their radii to a variable extent, dependent on the functional capacity of the defective retina.

Accordingly while the examination with large disks should be made on all field defects whether of anterior or posterior origin the results are much more striking in anterior lesions than in posterior lesions. This is true to such an extent that it is useful as a diagnostic point in differentiating anterior and posterior lesions. Of the anterior lesions those in the chiasmal region producing bitemporal hemianopsia make up the major part of the group and will be considered in this paper, those producing homonymous hemianopsia being reserved for a later communication.

The cases therefore which will now be briefly recorded in the first part of this paper are those presenting themselves for operation with rather badly damaged fields and a diagnosis of a lesion in the chiasmal region. We wish all the knowledge possible concerning the visual prognosis and the state of the defective retina before operation. After operation we wish to detect the earliest improvement in the defective area and to follow its progress. For this purpose the very small disks may show very little change, while a series of large disks may show marked improvement in the field. The inner field in all these cases represents the normal disk. The next larger field is taken with a disk twice the normal diameter, the third outer field is taken with a disk of twice the diameter of the previous disk or four times that of the normal disk, and likewise the outermost disk is twice the diameter of the next inner or eight times the normal disk. The small disks are not shown in this first series, but the same relation between disks holds down to the smallest which has a visual angle at perimetric distance of about 1.7 minutes, close to the limit of visibility. Of course when there is a scotoma the order of the disks is the reverse, the inner border representing the larger disk, and the outer border representing the normal disk so that if there are less than four margins in a scotoma, it means that a corresponding number of the largest disks are seen in the scotomatous areas and therefore are not recorded.

CASES WITH WELL ADVANCED FIELD DEFECTS.[1]

We wish to call attention to two rather striking examples of the prognostic value of our method of examination with regard to post-operative visual improvement.

CASE 1.—Surgical, No. 972, February 28, 1914. Pituitary struma, Mr. C. S., aged 49. A typical example of hypopituitarism with large sella, adiposity, headaches, and subjective failure of vision for eight months O. S., six months O. D.

Eyes.—Slight exophthalmos, hemiopic pupillary reaction present. Movements normal. Fundi,—disks O. U. show slight pallor, otherwise very little change.

Fields, March 1st (Fig. 1, Case 1, No. 1), show an almost complete bitemporal hemianopsia to the normal disk but in the lower temporal quadrants there is a marked response to the larger disks. This characteristic picture we have learned from a much larger series of cases than can be reported here indicates not only that the retinal function is only partially blocked in the defective region, but also that the field will improve after operation from below upward in a direction fairly pointed out by its own bud-like configuration. Before operation V. O. D. $\frac{20}{50}$, V. O. S. $\frac{20}{100}$.

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[1] Many of this group of cases may be found reported largely from a neurological surgical standpoint in a paper on bitemporal hemianopsia by Cushing and Walker in a recent issue of *Brain*. This report is confined to our method of perimetry and whatever light it throws on the prognosis and diagnosis.

ILLUSTRATING DR. WALKER'S ARTICLE ON "A CONTRIBUTION TO THE STUDY OF BITEMPORAL HEMIANOPSIA WITH NEW INSTRUMENTS AND METHODS FOR DETECTING SLIGHT CHANGES."

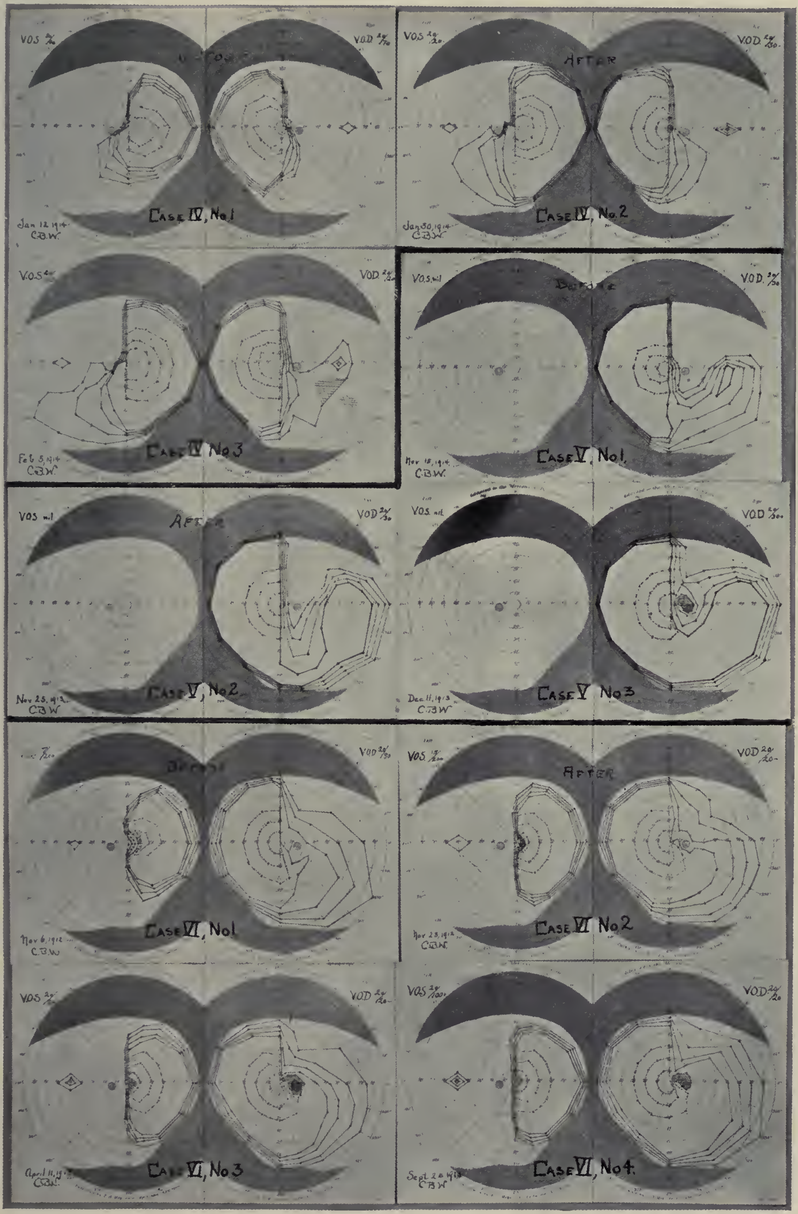

FIG. 2

Fields, March 10th (Fig. 1, Case 1, No. 2), five days after operation (transphenoidal removal of considerable soft chromophobe struma). The characteristic manner in which the return of vision takes place may be noted in the lower quadrants of both temporal fields.

Not only on account of the rather rapid rate of growth, as it were, of the visual field into the blind areas, but also because of the similarity of the picture to that of the sagittal section of certain buds, we find ourselves referring to this phenomenon as a budding process. Central acuity has also improved to V. O. D. $\frac{20}{30}$ and V. O. S. $\frac{20}{70}$.

Fields of March 16th (Fig. 1, Case 1, No. 3) show the next characteristic change, that is the bridging of the field of vision for the larger disks across the upper temporal defects, leaving a more or less marked para-central, or, to be more exact, an upper cæco-central[1] scotoma, tending to extend from the blind spot to the macula in the upper temporal quadrant. The relations of the different disks about the scotoma become reversed but can be kept in mind by noting the position of the outline for the normal disk. In spite of the scotomatous tendency the central vision has improved to V. O. D. $\frac{20}{20}$ and V. O. S. $\frac{20}{30}$. At this stage, often earlier, the patient insists on going home, as in this case, and we only learn by letter that further improvement has taken place.

This is a typical return of vision after operation for the stage of field defect shown in the first chart. We wish to call attention to the condition of the visual acuity in relation to the stage of the field defect in this and succeeding cases. Observe also the character of the scotomata, for they will be further discussed.

In contrast to the above case with marked response to large disks the following case shows practically no response to large disks in one eye and very little in the other.

Case 2.—Surgical, No. 203, June 27, 1913. Pituitary struma, Mr. M. B., aged 43. A fairly typical example of hypopituitarism with drowsiness, headache, and loss of vision as chief complaint. Visual failure for three years. Diplopia one year ago, now absent. A greatly enlarged sella with absorbed dorsum.

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[1] Traquair (*Ophth. Review*, March, 1914) has proposed the name centro-cæcal for this region, but to avoid as much as possible confusion with other uses of the word *cæcal* we prefer to transpose the components. Thus as we use the term an upper cæco-central scotoma arches across from the blind spot to the centrum and tends to lie more above than below the horizontal line.

Eyes.—Hemiopic pupillary reaction present. Fundi show very pale optic disks with slightly blurred margins. Optic cup filled and lamina cribrosa apparently obscured by a layer of new tissue extending somewhat into vascular trunks.

Fields, June 27th (Fig. 1, Case 2, No. 1), show a late stage with no response to large disks present except possibly centrally. O. D. and an atypical response to the large disks on the upper vertical meridian. O. S., the significance of which did not impress us at the time so much as that in the lower part of the nasal field. V. O. D. $\frac{6}{200}$, V. O. S. $\frac{20}{100}$. Our prognosis was bad for O. D., but hopeful of improvement for O. S. However the patient refused operation for about a month until the condition was considerably worse, as shown in Fig. 1, Case 2, No. 2, with V. O. D. $\frac{1}{200}$, V. O. S. $\frac{6}{200}$ and practically no response to large disks except along the upper vertical meridian O. S. The field was now one of rare symmetry for such an advanced stage and our prognosis for post-operative improvement was dubious since we had not seen improvement take place in the upper temporal quadrant as indicated by the response to large disks toward that region. Indeed we were later surprised to find the field actually budding out above (Fig. 1, Case 2, No. 3), although it was a slow process, occurring from six weeks to two months or more after the operation, the patient having left and returned for examination. It is notable that the visual acuity was reversed at this time, V. O. D. $\frac{4}{200}$, V. O. S. $\frac{20}{70}$, possibly the result of readjustments of the remaining struma, which we know may produce a tendency to homonymous hemianopsia or blindness of one eye as in cases of spontaneous asymmetrical rupture of the struma capsule. The history of diplopia and the presence of secondary changes in the eye-grounds as well as atypical fields indicate an extension of the lesion upward and around the nerves.

As an example of rapid onset to an advanced stage and rapid recovery following operation the following is a striking case.

CASE 3.—Surgical, No. 1–A, January 1, 1913. Pituitary struma, Mr. A. S., aged 61. A typical case of hypopituitarism with widely distended absorbed sella. Difficulty with vision began a year ago, but in the last few months has

Arch. of Ophthal., Vol. XLIV., No. 4. *Text-Plate X.*

ILLUSTRATING DR. WALKER'S ARTICLE ON "A CONTRIBUTION TO THE STUDY OF BITEMPORAL HEMIANOPSIA WITH NEW INSTRUMENTS AND METHODS FOR DETECTING SLIGHT CHANGES."

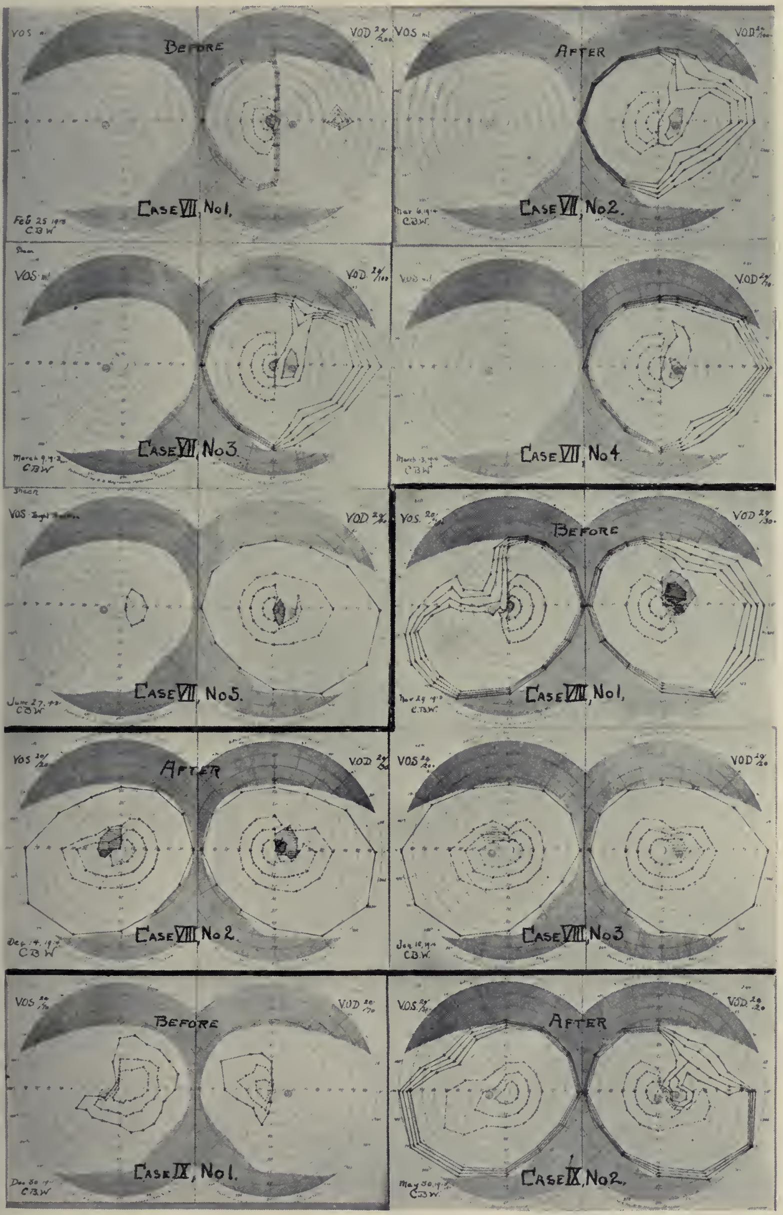

FIG. 3

failed with increasing rapidity. Bitemporal hemianopsia to normal disks recorded one month ago.

Eyes.—Pupils react to light directly and indirectly, the latter best from left to right. Slight nystagmus. Fundi: Disks show considerable pallor, most marked O. S. Lamina cribrosa sharp. Fundus otherwise in good condition.

Fields (Fig. 1, Case 3, No. 1) show a practically complete hemianopsia O. D. and a terminal stage O. S. The response to large disks is encouraging especially when interpreted in connection with an onset of increasing rapidity. V. O. D. $\frac{20}{200}$, V. O. S. $\frac{2}{200}$.

January 11, 1913. Transphenoidal operation with partial extirpation of chromophobe struma. Rapid recovery.

January 15th. Patient out of bed on fourth day and able to have fields taken. These show (Fig. 3, Case 3, No. 2) a wonderful improvement in the characteristic or gourd-shaped manner of budding into the lower temporal quadrant. V. O. D. $\frac{20}{30}$, V. O. S. $\frac{20}{200}$. The tremendous improvement of field and central vision noted in O. S. in four days is the record so far as we have observed in these cases. Such a sudden increase in the field would seem to indicate that the visual path had been under a strangulating pressure for a short time only—a matter of a few weeks—in order that the fibers should be in a condition of physiological block with relatively slight optic atrophy resulting. In fact in this case we know from the previous history that the stage of almost complete hemianopsia to the normal disk had been reached only four weeks previous to admission and doubtless at that time larger disks would have shown marked response in the lower temporal fields. Thus the gain during the four post-operative days may represent the amount of physiological block of the four, possibly less, pre-operative weeks. Hence the importance of considering duration and rapidity of passing from stage to stage while arriving at prognostic conclusions.

The following case is interesting not only as to prognosis but also in that it belongs in the group having an island of vision left in the temporal field.

Case 4.—C. H. H., December 17, 1912. Hypophysial struma, Mr. E. E. H., aged 32. Glandular symptoms slight, Sella distension and bitemporal hemianopsia being the leading characteristics. Visual disturbance began about six years ago and there have been occasional periods of diplopia.

Eyes.—Movements normal. No imbalance. Hemiopic pupillary reaction present, otherwise pupils normal. Disks show considerable pallor.

Fields, January 12, 1913 (Fig. 2, Case 4, No. 1), show a fair response to the large disks and we expect a certain amount of post-operative improvement in spite of the insidious onset. The presence of a temporal island to the largest disk is also encouraging. V. O. D. $\frac{20}{70}$, V. O. S. $\frac{20}{40}$.

January 13, 1913 (12 days after operation—decompression without struma removal). *Fields* (Fig. 2, Case 4, No. 2) show the characteristic sluggish improvement in cases of long duration. The appearance of a temporal island O. D. is rather unusual. It was especially sought for before operation but not found. V. O. D. $\frac{20}{30}$, V. O. S. $\frac{20}{20}$ –.

February 5, 1913. *Fields* (Fig. 2, Case 4, No. 2) show the manner in which these islands may be overtaken by the larger disk, at the same time showing enlargement in size and improvement in acuity as the gourd-shaped budding process is approaching. V. O. D. $\frac{20}{20}$ –, V. O. S. $\frac{20}{15}$ –.

While the manner in which an island may lose its isolation in recovery is shown well in the above case, the converse process of formation can be well made out in the next case.

CASE 5.—Surgical No. 578, November 13, 1913. Pituitary struma, Mr. W. S. M., aged 36. A typical example of adiposo-genital dystrophy with headaches, sellar distension, polyaria asthenia hypertrichosis, etc. Vision O. S. began to fail about three years ago and advanced through temporal hemianopsia to blindness in one year. Vision O. D. began to fail similarly about 1½ years ago.

Eyes.—Movements complete, myopia 7½ D. Disks, pallor marked, especially on left, with sharp stippling of lamina cribrosa. Hemiopic pupillary reaction present O. D. Consensual reaction to O. S. good, but direct pupillary reaction O. S. nil.

Fields (Fig. 2, Case 5, No. 1).—By means of the series of large disks we are able here to trace the manner in which the temporal island is dropped behind, and find that it is effected by an extension of the upper temporal defect down through an enlargement as it were of the blind spot, assisted by a corresponding variable amount of shrinkage from below so that result is a more or less vertical cleft through the blind spot. This will be even better shown in a subsequent case. It is notable in comparison with the subsequent and previous charts that the island is picked up by steps retracing the path along which it was dropped. The vision $\frac{20}{30}$ is remarkably good for this stage of defect. Prognosis good.

ILLUSTRATING DR. WALKER'S ARTICLE ON "A CONTRIBUTION TO THE STUDY OF BITEMPORAL HEMIANOPSIA WITH NEW INSTRUMENTS AND METHODS FOR DETECTING SLIGHT CHANGES."

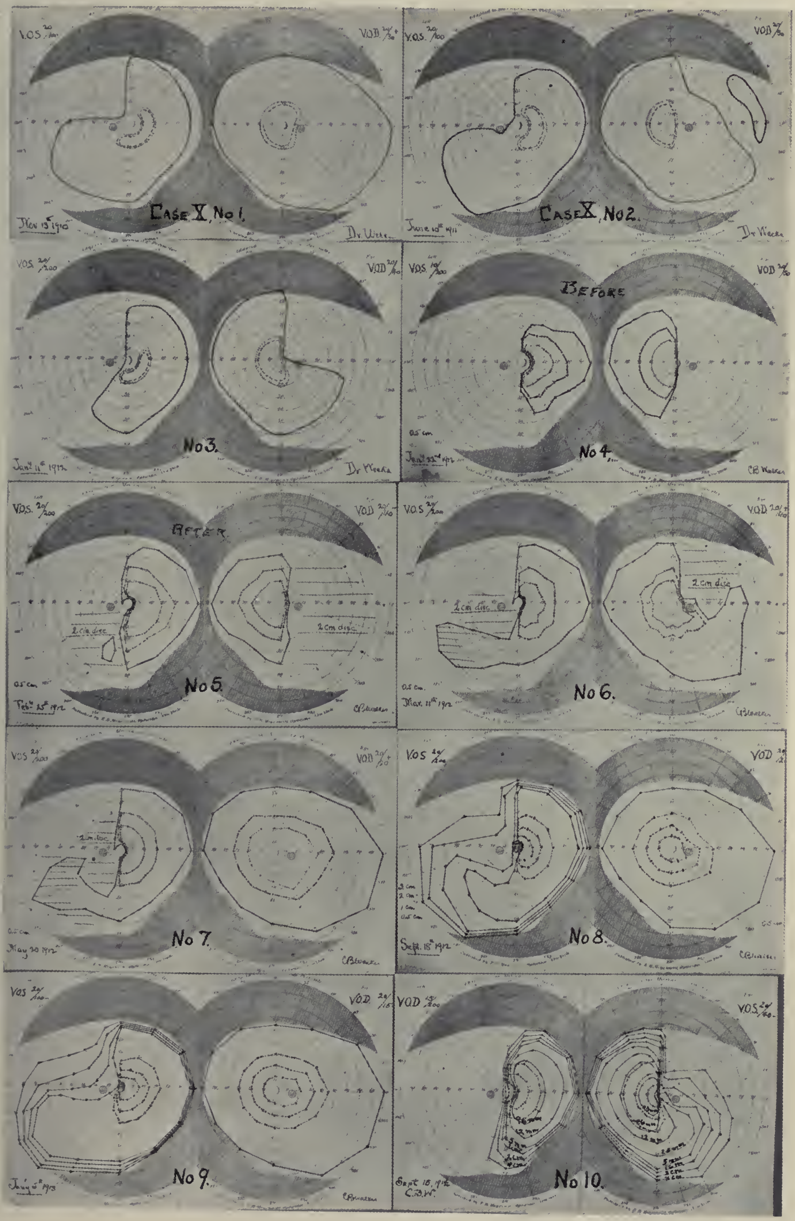

FIG. 4

November 20th. Operation: transphenoidal evacuation of large amount of soft chromophobe struma.

Fields of November 25th and December 2d (Fig. 2, Case 5, Nos. 2 and 3): the process of reclaiming the island and further improvement result in the characteristic closure of the upper temporal gap to large disks, leaving a cæco-central scotoma which may have been the first thing to appear as other cases will show.

The next case, while showing the temporal island and the cæco-central scotoma very well, is not prognostically instructive because the transphenoidal decompression was only partial.

Case 6.—C. H. H., November 4, 1912. Hypophysial struma, Mrs. P. T. S., aged 54. Glandular symptoms have not been marked. Sella enlarged. Failure of vision for three years. Slight headache at times and diplopia for a short time three months ago.

Eyes.—Movements complete, no muscular imbalance. Hemiopic pupillary reaction present. Optic disks pale especially on left. Lamina cribrosa fairly sharp.

Fields (Fig. 2, Case 6, No. 1) show a very satisfactory response to large disks O. D. The response however is slight in O. D. but the presence of the temporal island is encouraging (*cf.* next case) in spite of the lack of response in the vertical meridian.

November 11, 1912. Operation: transphenoidal decompression only partial on account of difficulties encountered.

The subsequent three fields (Nos. 2, 3, and 4) show very sluggish improvement. In the right eye a very typical cæco-central scotoma, somewhat gourd-shaped, is noted arching upward from the blind spot over to the macula. This not uncommon residual and often initial defect will be discussed later.

The following case gives a clue concerning the prognostic value of a responsive temporal island even in the presence of a non-responsive vertical meridian.

Case 7.—Surgical, No. 24, February 25, 1913. Hypopituitarism (typus Frohlich), Dr. R. E. S., aged 23. A typical example of adiposo-genital dystrophy typus femineus. Vision began to fail three years ago bitemporally but more markedly in O. S. which became blind a year ago. Field O. D. has failed markedly in last two or three weeks.

Eyes.—Movements complete. Pupil O. S. wide and inactive to direct light but good consensual reaction. Hemiopic pupillary reaction present. Optic disks very pale O. S., better O. D. Lamina cribrosa quite sharp, although slightly blurred apparently by a thin layer of new tissue.

Fields (Fig. 3, Case 7, No. 1) show a typical temporal island showing some response to large disks while vertically the field is split very sharply. The damage to central vision, V. O. D. $\frac{20}{200}$, is about the average for this stage of defect.

March 3d. Operation: transphenoidal removal of soft chromophobe struma.

Fields (Fig. 3, Case 7, No. 2), March 6th, show a very excellent recovery and indicate the stage of no response to large disks in the mid-line had just been reached, for we have other cases where complete bitemporal hemianopsia without a temporal island had been present and almost stationary for six months or a year, sometimes more, optic atrophy has taken place and no response to disks was found nor was there much of any improvement after operation. Central vision has improved slightly. V. O. D. $\frac{20}{100}$.

Fields, March 9th (No. 3), show further improvement, but the same general conformation is present as before. The defect evidently extended downward through the upper temporal quadrant, to fuse with a growing cæco-central scotoma involving the blind spot (*cf*. next case). This case evidently belonged to the group in which a corresponding defect appears in the lower temporal quadrant, extends upward to meet the upper defect as it progresses downward as an enlargement of the blind spot. Thus the temporal island was cast off, as it were, by the more or less vertical cleft through the blind spot. V. O. D. $\frac{20}{100}$.

Fields, March 13th (No. 4), show the upper and lower defects being repaired first and the scotomatous region last, indicating that the latter region either appeared first or is less resistant and more perishable. V. O. D. $\frac{20}{70}$.

Fields, June 27, 1914 (No. 5).—Probably the most striking thing here is the return of vision and pupillary reaction to O. S. both of which were decidedly nil by special tests before the operation. O. D. still shows a cæco-central scotoma to colors and the smaller disks, but only a relative scotoma not connected with the blind spot as indicated with the normal disk. V. O. D. $\frac{20}{40}$, V. O. S. light perception.

The following is an earlier case and shows the scotomatous type of failure more clearly.

Case 8.—Surgical, No. 1135, November 26, 1913. Acromegaly; Mr. H. A. E.; age 23. Typical early acromegaly with failure of central vision beginning five or six months ago. Headaches and enlarged sella. No diplopia.

Eyes.—Movements complete, no imbalance. Hemiopic pupillary reaction present on the left. Fundi, optic disk pale but with a slight blush of injection present. Nasal side of disk is paler than normal but still has more color than temporal side. Margins slightly blurred by a low grade of œdema.

Fields (Fig. 3, Case 8, No. 1) show a typical enlarging upper cæco-central scotoma O. D. with a beginning upper temporal defect approaching it. This process has been completed O. S., and the response to large disks gives a favorable prognosis, especially when the rapid onset is considered. Hemichromatopsia almost complete O. U. V. O. D. $\frac{20}{30}$−, V. O. S. $\frac{20}{30}$.

December 2d. Transphenoidal partial removal of large chromophobe struma.

Fields, December 14th (No. 2), show condition similar to what they probably were two or three months before operation, double upper cæco-central scotomata, color defect in upper temporal quadrant, and very slight form defect in upper temporal quadrant to the normal disks. V. O. D. $\frac{20}{30}$, V. O. S. $\frac{20}{20}$−. The next field, January 10th (No. 3), shows only relative scotomata, slight color, and no form defects to the normal disk in these quadrants.

The following case is given to show the end results where the nerves have been relieved of pressure, but a certain amount of diffuse atrophy has resulted.

Case 9.—J. H. H., Surgical No. 2898, December 26, 1911. Hypopituitarism with interpeduncular cyst. Mr. J. A., aged 19. Hypophysial insufficiency of the puerile type, sella somewhat enlarged and distorted, severe headaches for four or five years.

Eyes.—Movements complete, no muscular imbalance, disks pale, some new tissue obscuration of lamina cribrosa and optic cup, evidently result of previous period of choking. Hemiopic pupillary reaction present. Fields show contraction and bitemporal hemianopsis as taken with the normal disk only (Fig. 3, Case No. 9). V. O. D. $\frac{20}{70}$, V. O. S. $\frac{20}{70}$.

Transphenoidally at operation a cyst was opened but rhinorrhea and meningitis set in so that accurate fields were not taken for a long period. A subtemporal decompression was performed. The patient was taken home and later the vision began to improve. It was almost two years after the first operation that the patient reported in prime condition and with good eyesight. Improvement had evidently come to rest sometime previously. The atrophy was not sharp but diffuse in the upper temporal quadrants. The measure of this state of affairs is interesting as a final result and is shown in the fields of May 30, 1914. V. O. D. $\frac{20}{20}$, V. O. S. $\frac{20}{30}$.

It is not often that we are able to get together a series of charts showing so many of the typical stages as in the following case. The first three fields were taken by Dr. John E. Weeks of New York. This case is also interesting in that a relapse occurred after marked improvement. It will serve also to show the development of our method.

CASE 10.—C. H. H., Surgical No. 29117, January 20, 1912. Hypophysial struma. Miss E. V. H., aged 54. Slight symptoms of dyspituitarism with incipient achromatic manifestations. Enlarged sella. Failure of vision began eighteen months ago. The visual defects became complete bitemporal hemianopsia to normal disks during this period as shown in the first four charts (Fig. 4). The fourth chart shows the condition on admission, V. O. D. $\frac{20}{30}$, V. O. S. $\frac{10}{200}$. Eyes negative except for slight amount of disk pallor, and hemiopic pupillary reaction. January 27th, transphenoidal partial removal of struma.

Fields, February 9th (Fig. 4, No. 5), show the manner in which we first attempted to make some record of the fact that a certain amount of vision was present which was not measurable with the normal disk. A single large disk was used in the defective areas. It was found that more improvement was present than was suspected.

Fields, March 11th and May 2d (No. 6 and 7), show further improvement as measured in the rough manner then used. V. O. D. $\frac{20}{40}$, V. O. S. $\frac{20}{200}$ for No. 6 and V. O. D. $\frac{20}{20}$, V. O. S. $\frac{20}{200}$ for No. 7. The type of improvement was evidently practically the same as that in Case 1.

Fields, September 18th (No. 8), show the status of affairs more accurately when examined with a series of disks. Central vision in the left eye has been considerably damaged. V. O. D. $\frac{20}{20}$, V. O. S. $\frac{20}{200}$.

Fields, January 5, 1913 (No. 9), show the condition at the high tide of improvement. V. O. D. $\frac{20}{15}$, V. O. S. $\frac{20}{100}$. This condition was maintained for over a year and a half, but during a European trip, abruptly terminated by the war, her vision began to fail and she returned to have the following fields taken.

Fields, September 15, 1914 (No. 10), were taken with the complete series of disks as far as they could be satisfactorily used. The four outer peripheries are with the same disks used in the previous cases, but inside the normal boundary are found the peripheries for the smaller disks down to the smallest which can be seen. These disks will be discussed later. It will suffice here to call attention to the fact that the damage to the central vision may be plotted in terms of response to these small disks as well as the peripheries, and thus the whole field is mapped out in isopters, as it were, suggesting somewhat the drawing of a contour map.

From the foregoing cases the impression may be gotten that practically all cases of this group show both response to large disk and field improvement after operation so that we are determining a prognosis that we can take for granted. Fortunately such an impression would be true in the great majority of cases but occasionally would lead to error if the larger disks were not employed. For instance the following cases might have been assured of a good recovery of peripheral vision if only the normal disks were used in taking the field.

Case 11.—Surgical No. 435, September 27, 1913. Hypophysial struma, Mr. H. C. N., aged 42. Failing vision for two years associated with frequent headache, diplopia, nausea, and vomiting. Complete bitemporal hemianopsia for over one year. Examination on admission, hypophysial insufficiency, sella turcica obliterated, neighborhood disturbances.

Eyes.—Transitory weakness of the third nerve with pupillary inaction on right. Left pupil reacts well directly and consensually.

Fields (Fig. 5, No. 1) show a complete bitemporal hemianopsia of unusual symmetry. The fields are vertically cleft and show no response to large disks. Double relative central scotoma to the normal disk. V. O. D. $\frac{20}{70}-$, V. O. S. $\frac{20}{70}+$. The prognosis was of course unfavorable for field improvement in the absence of a temporal island or of response to large disks.

October 3, 1913. Transphenoidal removal of a large amount of struma which had broken through the capsule practically in the midline and filled the sphenoid cavity.

Fields (Fig. 5, No. 2) taken before discharge October 10, 1913, show no change but the central vision has improved slightly, V. O. D. $\frac{20}{50}-$, V. O. D. $\frac{20}{50}$.

At the last report, May 4, 1914, from Dr. Emory Hill of Chicago, there was still a sharply vertically cleft complete bitemporal hemianopsia but the central vision had improved, V. O. D. $\frac{20}{25}$−, V. O. S. $\frac{20}{30}$+.

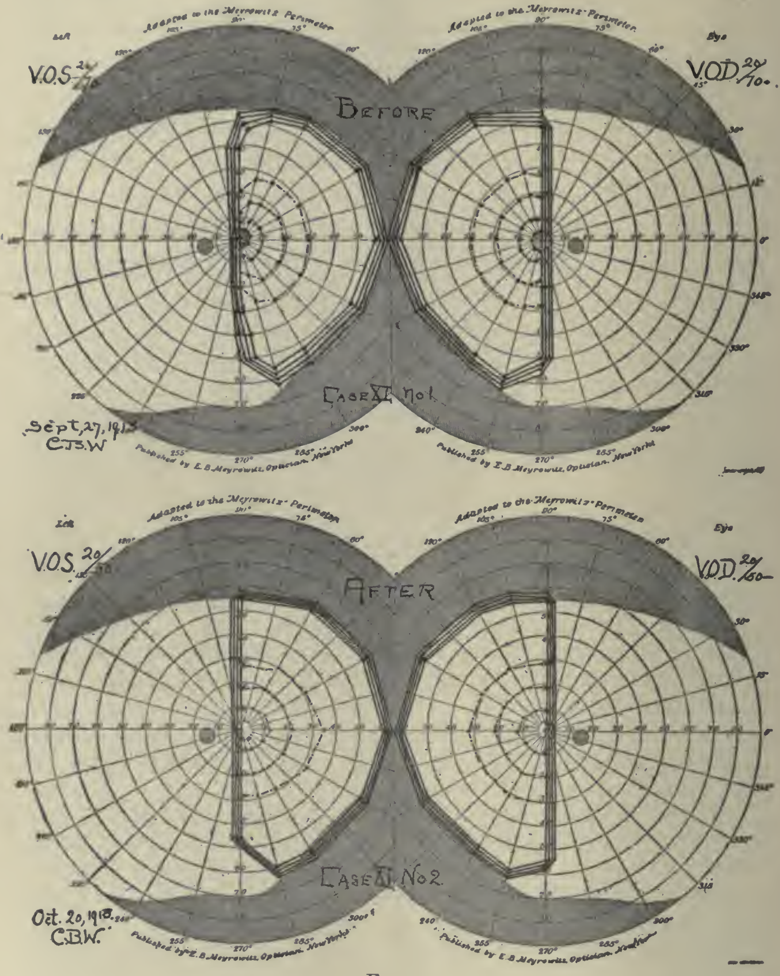

FIG. 5.

DISCUSSION.

(*First Part.*)

The cases so far presented represent the more striking features of a much larger number than can be included in the report. And while we speak from these cases as types our remarks are tempered by experience with numerous additional cases.

It is obvious that the presence of response to large disks before operation has a somewhat different significance than it has a long while after operation. In general before operation we have found response to large disks to represent a state of partial block in the defective regions, and that recovery of functions may be hoped for in the direction of greatest response provided satisfactory decompression is obtained, without excessive reaction. Further where there has been a rapid field shrinkage during the last few weeks before operation the prognosis, even though the response be somewhat less in amount, is more encouraging, other things being equal, than where the defect has been of gradual onset over a much longer period of time. Also it must be noted that under the same conditions the presence of a temporal island has so far always been found to indicate a post-operative improvement. In the absence of a temporal island and also of response to large disks our prognosis is apt to be reserved to central vision which usually improves in all cases.

After operation, six months to a year or more, it is evident that if complete field recovery to the normal disk has not taken place, response to the larger must be interpreted differently. It is notable in cases of this sort (9 and 10) the defect does not show a sharp line of cleavage along the line of defect to the normal disk as in a homonymous hemianopsia of posterior origin, but response is found to be present. This condition of affairs when it is found to be constant for some time represents usually a diffuse atrophy in the corresponding optic path and can be measured as isopters by the graduate disks. Of course it may also indicate presence of a certain amount of residual pressure or possibly a subsequent recurrence of the struma as in Case 10.

Concerning the position of this atrophy in the optic path it may be remarked in passing that we believe the atrophy often takes place first in the optic tract, and fibers in the nerve itself are supported by the retinal ganglion cells till a much later period. Certainly we have found in nerve sections very little atrophy even where there has been marked field defects and even blindness for two years or more. However a more detailed account of this work will be presented in another paper.

In addition to prognostic evidence afforded by the persistent use of graduated disks interesting details in the formation and behavior of cæco-central scotomata and temporal islands are brought into relief; with a remarkable consistency the temporal island has been found almost in the center in the neighborhood of 50°. This point is evidently for some reason the strongest portion of the temporal field, and even when a temporal island is not formed the field usually recedes along an arc through this point and likewise recovers through the same region, even when it occurs from above. It is notable that not infrequently the temporal island is detected only with the largest disk in these cases and that variations of the position of the island are downward into the lower temporal field.

Likewise the cæco-central scotomata have been noted to possess certain decided tendencies. Usually they seem to appear midway or thereabouts in the upper cæco-central area and then arch toward the blind spot, which tends to enlarge and coalesce with the scotoma as it also extends toward the centrum and the vertical meridian. The latter approach may be very precise so that the vision is lowered but little at first and the vertical meridian not crossed. There are cases much more uncommon where the centrum is invaded early and is seriously forming the most decidedly scotomatous group. Often the cæco-central scotoma enlarges upward to meet the advancing peripheral defect in the upper temporal quadrant. In this way a defect may be created downward through the blind spot, and in some of these cases an invagination of the field from below upward toward the enlarging blind spot, resulting finally sometimes in a complete vertical defect through the blind spot splitting off, as it were, the temporal island.

In other cases, however, the cæco-central area is only relatively and but little more affected than the rest of the temporal field, which may then recede from above downward quite symmetrically except for some lagging, as the region of resistance, before mentioned, in the temporal field tardily succumbs, so that even in these cases there may be a suggestion of the familiar gourd-shaped configuration.

While in general the corrected visual acuity should always be recorded on the chart, particularly in these cases should it be given a prominent place, and kept distinctly in mind during the examination. To take the field, as is not infrequently done, before taking the vision is decidedly getting the cart before the horse. The vision gives first of all a clue as to the possible fixation ability and the size of spot that should be used as a fixation point. In the next place it often gives an idea of what stage of the field defect to expect since in a general way it varies with the field in the average case (*cf.* Fig. 6). In the same way it often gives an idea as to the status of the cæco-central area. As a rule the presence of a relative central scotoma can be made out even with the normal disk when the vision begins to fall below $\frac{20}{70}$ or thereabout. With smaller disks it can be demonstrated much earlier. Again when the vision is down to the neighborhood of $\frac{3}{200}$ and any part of the normal field is recorded as reaching into the centrum in good condition it is pretty sure to be a mistake.

Immediately after the operation the recovery of field may be so rapid for three or four days that several steps in the recovery process cannot be recorded owing to the patient's physical inability to stand examination. But in the greater number of cases fields taken every three or four days will satisfactorily show the stages of recovery. Some cases however show very little improvement in the first two weeks, and a few may even give evidence immediately after operation of some temporary depression of vision or a certain readjustment of the lines of cleavage as found before operation.

The process of field recovery after operation is largely the reverse of the process of damage. The portion last damaged usually recovers first, except it happens to be the central or cæco-central area, which may be the last to recover in any case or perhaps may remain somewhat damaged permanently. Recovery usually begins then in the lower quadrant (with rare exceptions, *cf.* Case 2) and tends to bud out along what we call the arc of greatest resistance, 50° in the temporal field. At the same time the temporal island if present begins to enlarge until it is overtaken or rejoined by the extension from below, sometimes forming a more or less uncinate configuration. In this process, as in the next step of bridging across the gap in the upper temporal quadrant, the large disks will often show what is going on before it is clear with the smaller disks.

As these improvements are going on in the peripheral parts of the temporal field it is usually noticed that the more central portion, in and around the region of the cæco-central area, is decidedly backward in repair, even though in many cases it may not have suffered very much earlier than the rest of the temporal field during the onset. In the more scotomatous types of onset the recovery of the cæco-central area is still more disproportionately retarded and sometimes it remains permanently damaged. Nevertheless there are exceptions to this as to most of the generalities that can be made concerning these cases. Thus in Case 8 it can hardly be said that the scotomatous areas were unduly slow in repair, but of course a more rapid recovery throughout is the rule in cases having an early operative sellar decompression.

Before leaving this subject of visual prognosis in hypophysial cases after a transphenoidal decompression, it may be well to get a general impression of the prognosis from the statistical standpoint. To do this graphically we have divided the course of the field defect arbitrarily into a satisfactory number of stages for descriptive purposes. Each stage does not necessarily represent an actual field which has been taken, but rather the composite of a variety of configurations representing approximately a certain status of field defect.

In case the field defect does not correspond to a definite stage, it can be referred to as being between certain stages, and if points along a line are arranged to represent definite stages, then these intermediate cases may be represented by points correspondingly placed between stage points. In this way the condition of a field before operation may be approximately indicated by a point on a line, and in like manner the status of a field some time after operation may be represented by a point on another parallel line on which the stages are slightly altered, especially as regards the cæco-central damage, to represent the difference in the returning configuration as compared with the similar onset stage.

Since the stages are so numerous it becomes difficult to keep in mind the configuration corresponding to a certain stage number. Accordingly in the accompanying graphic representation (Fig. 6) small sketches of the field stages accompany the number on the vertical side line, those on the left indicating stages before operation and those on the right indicating

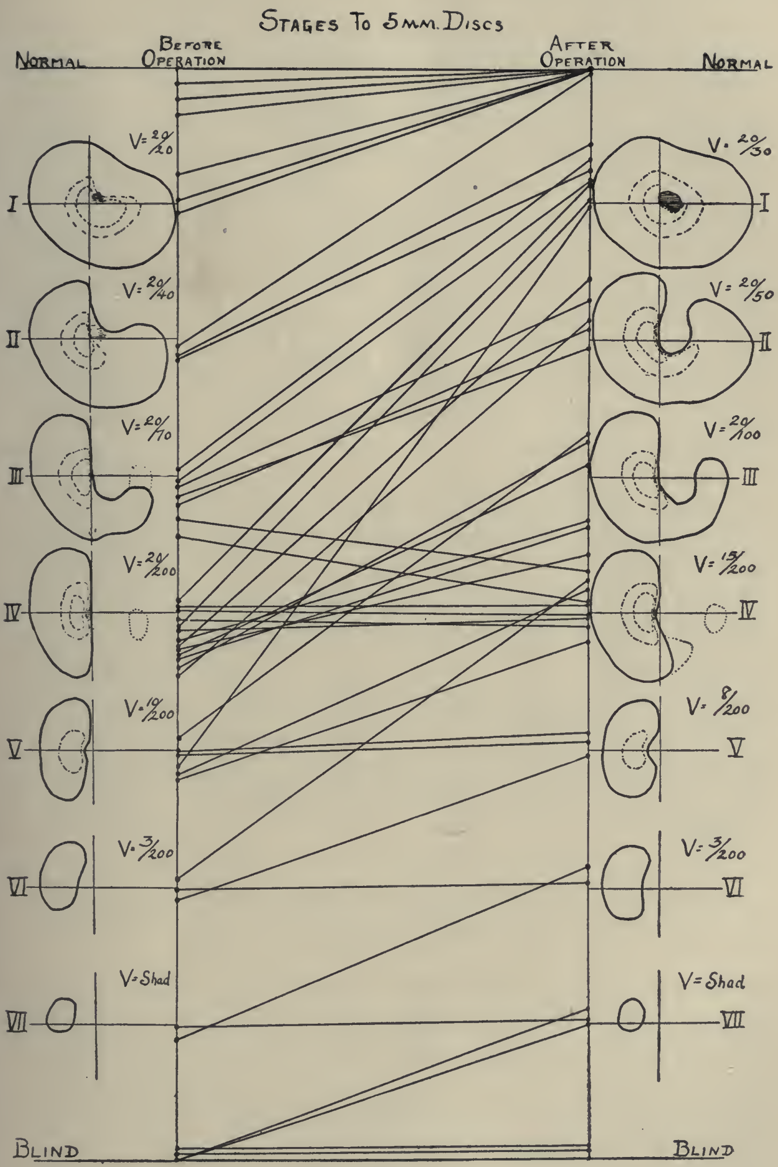
Stages To 5mm. Discs
Normal
Before Operation
After Operation
Normal
V=20/20
I
V=20/30
I
V=20/40
II
V=20/50
II
V=20/70
III
V=20/100
III
V=20/200
IV
V=15/200
IV
V=10/200
V
V=8/200
V
V=3/200
VI
V=3/200
VI
V=Shad
VII
V=Shad
VII
Blind
Blind

FIG. 6.

corresponding stages of recovery. A line connecting a point on the left vertical line with a point on the right vertical line will indicate the stage to which an eye improved, after operation, from a certain stage before operation. Except for the fact that some cases improve so rapidly immediately after operation and so slowly later on, the horizontal line could be made to represent time duration, and a curve could be plotted to represent improvement with respect to time after operation. This has not been done here (Fig. 6) because of the space necessary. Since it is difficult, as a rule, to get satisfactory field reports after the patient leaves the hospital, often less than two weeks after operation, there is no doubt but that the improvement recorded in most of the cases indicated in Fig. 6 falls far short of what has actually taken place if we could have continued to record.

Nevertheless a decided upward slant of the lines proportionately indicating the improvement during the short period may be noted in the diagram. It is only rarely that the growth has been such as to result in a continuation of failure after operation. Aside from a rarity of this sort, it is notable that practically all the cases improve if operated on before stage four is reached. In stage four there is noted a decided tendency for the field to remain stationary although the central vision usually improves. In all the more advanced stages the same tendency may be observed; obviously then the prognosis is considerably more favorable before than after stage four is reached.

METHOD OF PERIMETRY AND DETECTION OF THE EARLIEST FIELD CHANGES

It is now over a quarter of a century since Bjerrum first demonstrated the value of field examinations with test objects of very small visual angle, and yet this very valuable method has been used to a very limited extent in this country, many of the larger clinics being without means of making the test. This is doubtless due to the labor and time necessary to make the examination.

In brief it has been my endeavor to devise a method of performing field tests with objects of reduced visual angle and still keep the time and labor factors within reason for a complete examination.

Bjerrum, in order to get smaller visual angles, used the smaller perimetric disks and increased the perimetric distance from one to two meters because of the difficulty in making very small spots. Others since then have used as small as 1*mm* at two meters' distance. This gives a visual angle of 1½ to 2 minutes which is as small an angle as can be satisfactorily used, the field being only somewhat over 20° in extent for that size. The record of the disk is given in millimeters as fraction, thus: $\frac{\text{disk diameter}}{\text{perimetric distance}}$; since this is virtually a record of the visual angle of the test object, it being only necessary to multiply by $\frac{180}{\pi}$ to obtain the value in degrees.

The extension of time and labor elements in making a complete field record of a case arises in the following manner. After the usual perimetric examination, if we use the Bjerrum screen we must readjust the patient and proceed to make a second examination. Now difficulties with the screen may enter: 30° to 40° for the complete series of disks must be available on the curtain; that is, it must be 2 meters square or larger at 2 meters' distance except the fixation point is changed from side to side of the curtain. Without an adjustable chair or curtain, variations in the fixation point also result from variation in the stature among patients. Because of necessary variation in the position of the fixation point, the curtain cannot be ruled if it is to be used in all cases, but the readings must be taken with a protractor and rule, such as described by Traquair. But even at best, with a large ruled adjustable curtain and constant fixation point, it is necessary to use pins to mark the readings, and much time is consumed in accurately copying them onto the chart when a number of complicated isopters are plotted.

Further difficulties, such as the inaccuracy at the margins of the screen on account of its being a plane surface, the difficulty for presbyopic individuals with additional refractive errors in seeing the smallest visual angles at the middle distance of two meters, and the variations in light intensity at that distance as compared with that at the perimeter distance, have also been considered.

It is of course very desirable in all cases to make a complete examination at one sitting of the shortest possible length. Especially with hypophysial cases, who are apt to be drowsy, asthenic, or apathetic, must the examination be fairly rapid or the record will remain incomplete.

Accordingly, in order to reduce the time and labor elements to a minimum and at the same time meet as many difficulties and conserve as much accuracy as possible, we have devised the following apparatus.

THE NEW PERIMETER AND DISKS.

If we could make a perimeter on which measurements of 30° to 40° could be made in any direction from the center and could make reliable practically rimless spots small enough to represent the required range of visual angles on that perimeter, we would be approaching our aim. This we have found difficult but entirely possible.

The disk series was first worked out practically and theoretically until the series given in Fig. 7 was decided upon.

Author's Series of Disks.			Bjerrum Series.		Chart Letters of Nearest Equivalent Visual Angle.
Diameters in *mm.*	Visual Angles on 28.6*cm* Perimeter.		Equivalent Values in Minutes.	Ratio of Diameter Distance in *mm.*	
	In Degrees.	In Minutes.			
0.15	$\frac{1}{32}$°	1.8′	1.7′	1/2000	20/5
0.31	$\frac{1}{16}$°	3.7′	3.4′	2/2000	20/10
0.62	$\frac{1}{8}$°	7.5′	8.6′	5/2000	20/30
1.25	$\frac{1}{4}$°	15.0′	17.2′	10/2000	20/50
2.5	$\frac{1}{2}$°	30.0′	34.4′	20/2000	20/100
5.0	1°	60.0′	57.3′	5/300	17/200
10.0	2°	120.0′	114.6′	10/300	8/200
20.0	4°	240.0′	229.2′	20/300	4/200
40.0	8°	480.0′	458.4′	40/300	2/200

FIG. 7.

This series starts with the normal disk 5*mm* in diameter so universally used. Above and below this size the diameter of any disk is one half that of the next larger and twice that

Illustrating Dr. Walker's Article on "A Contribution to the Study of Bitemporal Hemianopsia with New Instruments and Methods for Detecting Slight Changes."

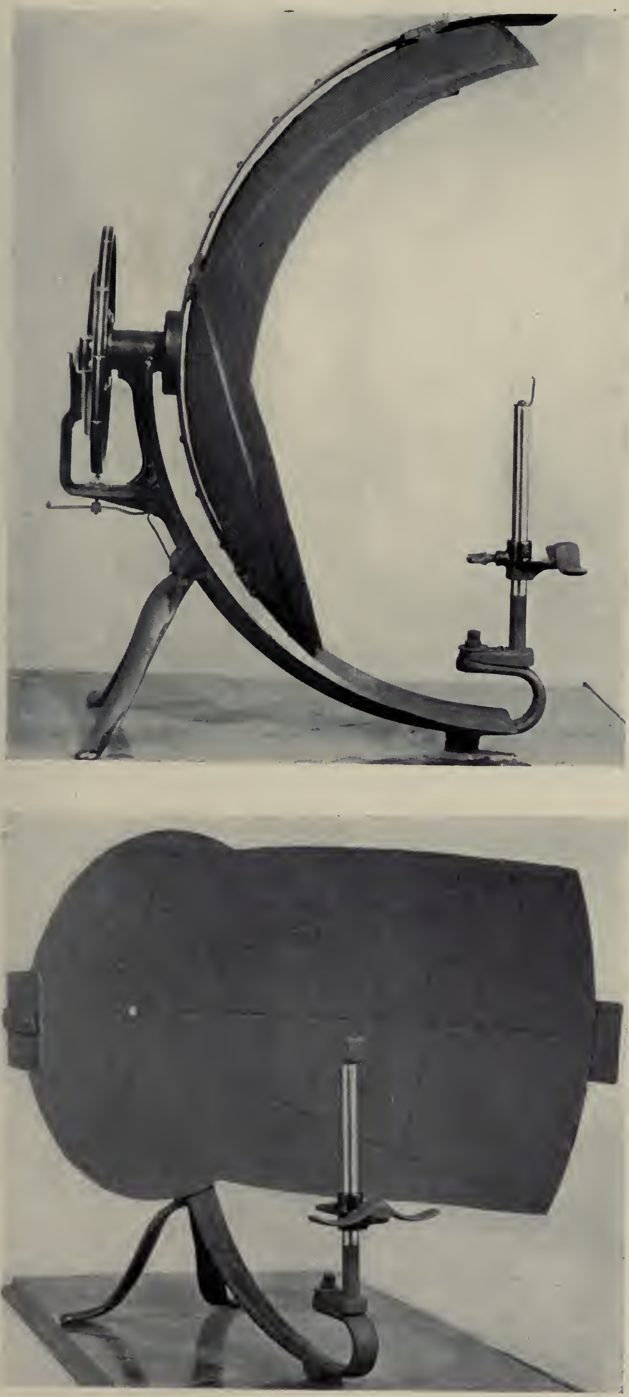

Fig. 8

of the next smaller disk. The largest disk is 4*cm* in diameter and the smallest is 0.15*mm* in diameter. Disks above 1*mm* in diameter are flat with knife-edge protection for the mat white paper surfaces. Before 1*mm* diameter we have found the mechanical difficulties to be best met in the following manner. A piece of the whitest ivory, such as may be gotten from a cataract-knife handle, is tapered either with a knife or on a lathe until the diameter at a certain point with the micrometer calipers is equal to that of a certain disk, and the diameter at another point about 1*mm* distant is equal to that of the next size of disk. Cutting through these two points we have accurately made two of the desired disks. We have only to force this small tapering cylinder wet with cement half-way through a tightly fitting loop at the end of a fine stiff wire and we have a test object which will stand a remarkable amount of rough treatment. It was further surprising to find that the projecting ivory surface of these tiny spots did not become soiled by scraping on the perimeter but were rather kept bright by the friction. If, however, in some way a disk did get soiled it was quickly brightened by the gentlest touches on very fine emery cloth.

Although not absolutely necessary as far as practical use goes, our perimeter was slightly extended so as to have a working radius of 28.6*cm*. Large wooden dies to this radius were turned, and a circular section of a sphere was made for the center of the perimeter by pressing a thin sheet of brass between the dies. This gave 35° in all directions about the fixation point. A second segment was also similarly made and soldered to the edge of the circular piece so that a section of a sphere was made extending 95° from the fixation point along three of the 30° radiating lines and at least 35° along all of the other lines radiating from the fixation point (*cf.* Fig. 8). On the surface of this spherical shell, lines sufficiently depressed so as not to be obscured by mat black paint were made corresponding to all the lines in the same area on the field chart.

A large area of this sort saves much time in working out difficult and peculiar isopters and scotomas. Many readings can be taken rapidly without losing the continuity of affairs incident to continually resetting the narrow perimeter arm. The very slight error due to the slight tilt of the test object is quite constant and negligible as far as I have been able to detect for all practical purposes. An entire field may often be taken with but four settings of the perimeter.

Another novel feature of this perimeter is the possibility of automatic *eccentric fixation.* This possibility arises from the fact that the described spherical portion is fitted with rollers on the back by means of which it may be slipped on to the arm of any standard plain perimeter with sufficient friction to maintain itself in any position. If now instead of stopping when the fixation point is at the axis of rotation we push the spherical shell 30°, for instance, past the axis, then when the patient's head is straight on the chin rest the eye is rotated so that obstructions such as the eyebrow, nose, and cheek will not mark so much of the field in those regions. Much larger fields may be gotten in this way on the nasal side and peripheral changes in this region may be noted proportionately earlier. Better fields can be gotten in cases with deep-set eyes or large noses when eccentric fixation is used. The upper eyelid is a very common offender. We have not been successful with a mechanical device for holding up the lid without discomfort. The quickest and most comfortable way we have found seems to be simply to hold the lid up with a rotary motion of a narrow pencil eraser at the moment the reading is taken.

As we have emphasized elsewhere, mechanical perimeters cannot be made to fulfill our numerous demands, especially in the more difficult field types where the best perimetry is demanded. Also since we wish to record a complete examination on one chart, we cannot use the ordinary small chart but require a chart practically twice the usual size. This chart has been made for us by Bonschur & Holmes, Philadelphia, to fill exactly an ordinary hospital history sheet. The instruments are in the hands of E. B. Meyrowitz, New York.

It is of course a great task for both patient and observer to take a complete field with the whole series of nine disks, and it is not necessary except for purposes of a study such as we have attempted. It is not difficult after a few trials to pick out the disks which will show the more important changes and leave out those which do not add much information. Thus in the following case it would be possible to omit several disks without marked loss of information. However, by so doing, it sometimes happens in a series of fields that certain disks show changes in a certain stage but are found to have been omitted in others of the series. The following case, besides showing the full series of disks before and after operation, is also interesting in the rather unusual field configuration in the left eye.

CASE 12.—Surgical No. 1664. Acromegaly. Hypophysial tumor (?).

August 19, 1914, Mr. M. T. C., aged 25. Acromegalic symptoms first became noticeable when 16 years of age and have become progressively more marked. Headaches for five years; with onset of headaches there was a period of diplopia and failing vision; patient "couldn't read and couldn't see on the sides." This lasted for two or three months. Since then diplopia has disappeared and patient thinks vision has been gradually improving. Night sweats, polyuria, polydipsia, polyphasia, drowsiness, and asthenia have been prominent symptoms during the last three or four years.

Eyes.—Extra ocular movements free and complete, no ptosis, exophthalmus, or diplopia at present. Pupils equal, possibly left slightly larger than right. Both read well to light, accommodation, and consensually. Fundi, optic disks show a slight pallor, if anything more marked in the left eye where the nasal side of the disk is almost the same color as the temporal side. Optic cups wide and shallow with lamina cribrosa readily seen but not sharply stippled. Fundus otherwise in good condition. (Fields and vision, Fig. 9.)

August 22, 1914. Transphenoidal sellar decompression with partial removal of struma (tumor?). Uneventful recovery.

August 29, 1914. Patient forced to leave hospital before a great amount of improvement in fields had taken place. (Fields and vision, Fig. 10.)

The fields in this case show the unusual condition in the left eye where the damage from below upward through the blind spot is about equal to that above downward, resulting in the temporal island formation in the neighborhood of 30°. Whether this configuration bears a relation to the asymmetry of the growth or to the arrangements of the fiber bundles in the chiasm, we cannot be sure, though we are inclined to believe it throws some light on the character of the growth. It may

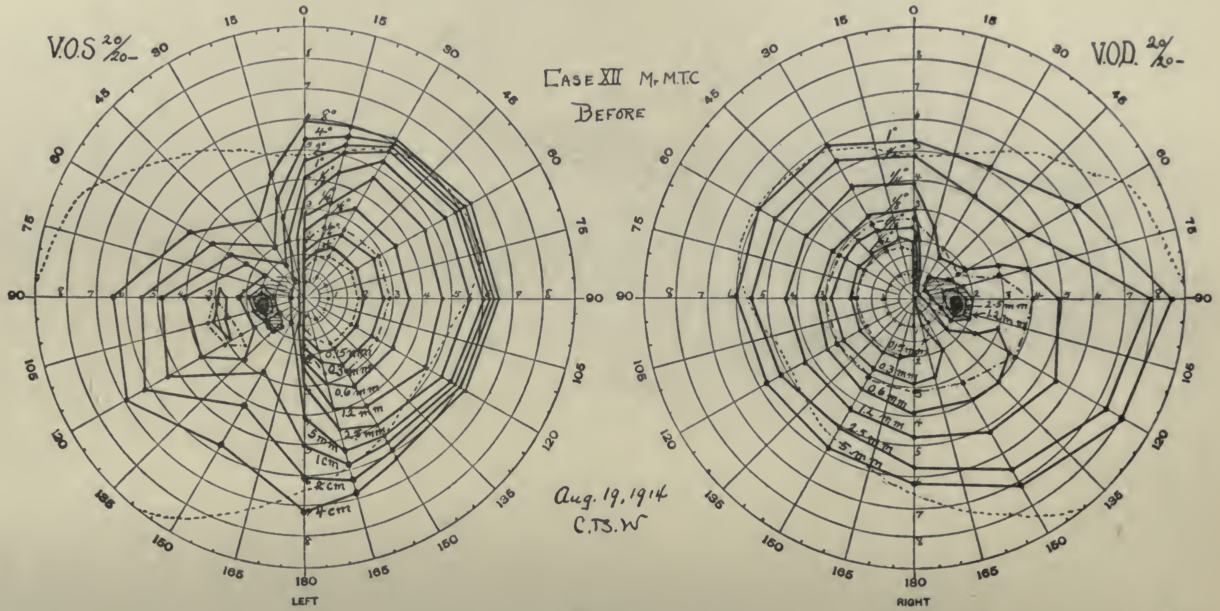
V.O.S 20/20-
Case XII Mr. M.T.C
Before
V.O.D. 20/20-
Aug. 19, 1914
C.B.W
LEFT
RIGHT
8°
4°
2°
1°
1/2°
1/4°
0.15 mm
0.3 mm
0.6 mm
1.2 mm
2.5 mm
5 mm
1 cm
2 cm
4 cm
0.15 mm
0.3 mm
0.6 mm
1.2 mm
2.5 mm
5 mm
2.5 mm
1.2 mm

FIG. 9.

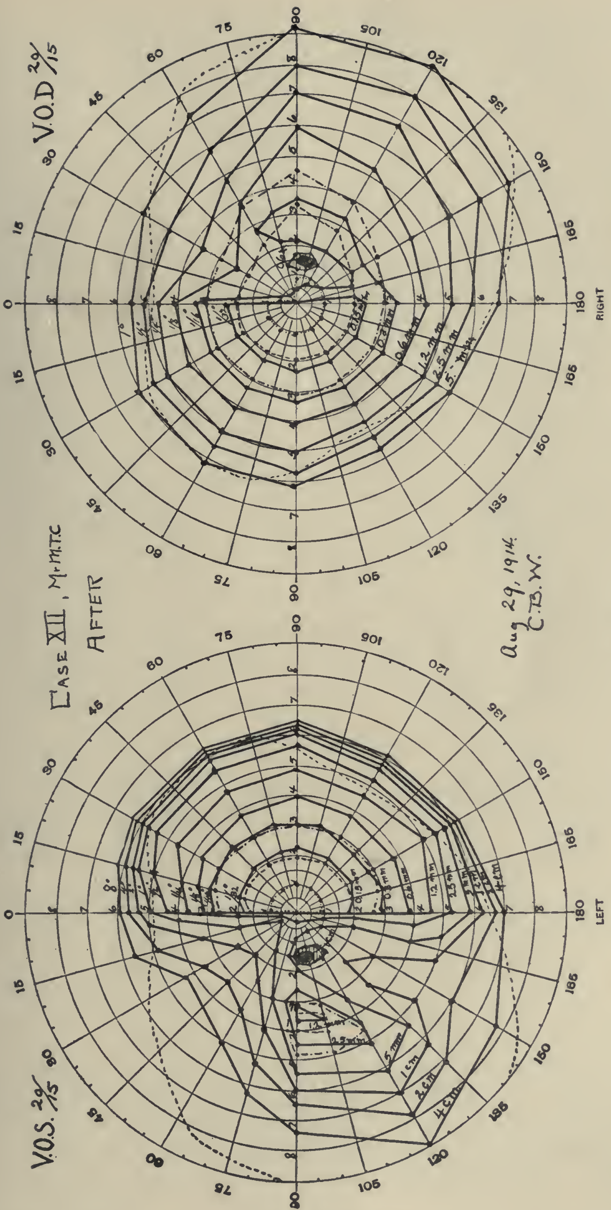
V.O.D 20/15
V.O.S. 20/15
Case XII, Mr M.T.C
After
Aug 29, 1914
C.B.W.
RIGHT
LEFT
0.15 mm
0.3 mm
0.6 mm
1.2 mm
2.5 mm
5. mm
1 cm
2 cm
4 cm

FIG. 10.

be noted that central vision is remarkably good in this case and that in the right eye where the stage is early, the smaller disks (0.3 and 0.6*mm*) record the greatest change after operation.

Of the very early cases the next four cases may serve as typical examples. In these the largest disk used is the 2.5*mm* or half normal disk, since it gives practically a full field and allows us to use somewhat less eccentric fixation. The following case is one of the earliest and shows that, before the patient notices any subjective difficulty whatever, the smaller visual angles show definite change. The figures will be more reduced than in the previous case in order to save space, but the fields were taken in the same manner on large charts.

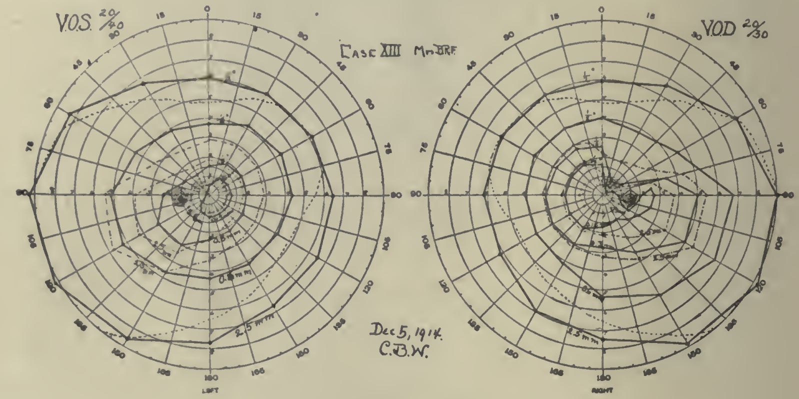

FIG. 11.

CASE 13.—Surgical No. 2162, December 11, 1914. Acromegaly, Mrs. B. R. F., aged 23. Onset of acromegalic symptoms began during first and only pregnancy three years ago. Since then skeletal overgrowth has continued with hypertrichiasis, polyphasia, and amenorrhea. Sella turcica enlarged. No subjective visual disturbance.

Eyes.—Movements complete, no muscular imbalance. Low-grade (−1.25 D.) myopia. Fundus, negative except possibly very slight pallor of optic disks.

Fields (Fig. 11) show very early changes to the smallest disks. Operation postponed.

While this patient showed definite changes of characteristic type it was deemed advisable to delay operation not only because the patient had no visual difficulty but also because our method of examination had not been tested far.

In the next case the changes are somewhat more marked and the operation was performed.

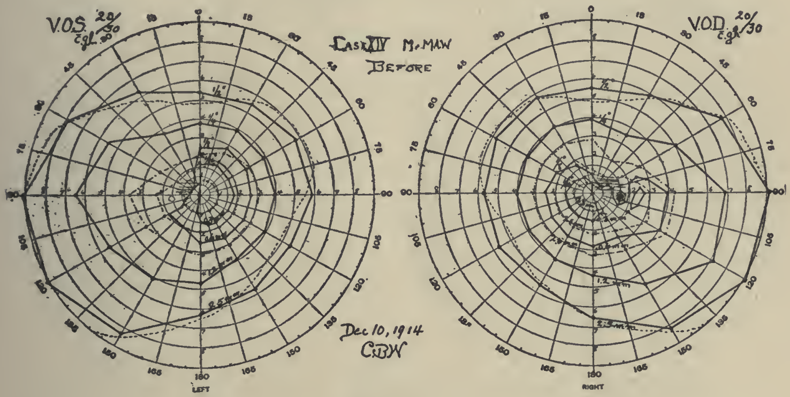

FIG. 12.

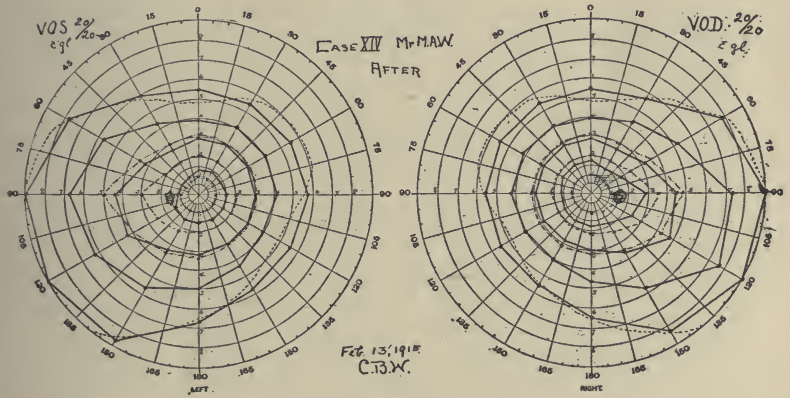

FIG. 13.

CASE 14.—Surgical No. 2403, December 10, 1914. Hypophysial struma. Mr. M. A. W., aged 45. Well developed case of acromegaly beginning eight years ago. Bitemporal and vertex headaches eight years. Polyuria and polydipsia three years. Complete loss of libido and potentio sexualis five years. No subjective visual disturbance. Enlarged sella turcica.

Eyes.—Lids puffy and œdematous. No exophthalmus or imbalance, movements free. Myopic fundus. Slight disk pallor. (Fields and vision, Fig. 12.)

January 26, 1915. *Fields*: Temporal shrinkage to almost complete hemianopsia for 0.6*mm* disk. V. O. D. $\frac{20}{30}$, V. O. S. $\frac{20}{30}$.

January 29, 1915. Transphenoidal decompression with partial extirpation of pituitary struma.

February 13, 1915. *Fields* (Fig. 13) show a return to almost normal outlines even to the smallest disks.

The early changes found in this case with the smaller disks show the same general tendency as may be seen in the later stages to the large disk—that is, the failure is downward through the cæco-central area and also upward from below to a less extent but toward the same region so that a temporal island may be demonstrable even to the smaller disks.

The following case is similar but somewhat more advanced especially in the left eye.

Case 15.—Surgical No. 4437, January 25, 1915. Mrs. C. N., aged 45. Hypophysial struma. Fairly well developed case of acromegaly. Skeletal changes and headaches for seventeen years, more pronounced last five months. Central blur in vision of left eye for five months. Sella enlarged.

Eyes.—Slight exophthalmos; lids puffy and œdematous; movements and balance good. Fundus good condition except slight disk pallor more marked on left. (Fields and vision, Fig. 14.)

February 2, 1915. Transphenoidal partial extirpation of pituitary struma.

February 13, 1915. *Fields* (Fig. 15) show a very satisfactory return to almost normal outlines. The enlarged blind spot becomes of normal size after operation and the temporal island made out in the left eye to the 0.3*mm* disk loses its isolation in the enlarged field to that disk. But most striking and satisfactory was the recovery of central vision and shrinkage of the central scotoma until it could be hardly demonstrated with the 0.3*mm* disk.

The following case is unusual in the configuration of the field defect and should be compared with Cases 2 and 12.

Case 16.—Surgical No. 2502. January 6, 1914. Hypophysial struma. Mr. H. F. P., aged 47. Failing vision first noted eight months ago. Gain in weight, drowsiness, dry skin, eczema, constipation, sella enlarged.

Eyes.—No exophthalmos or muscular imbalance; movements free. Fundus normal except for slight disk pallor more marked in left.

Fields and vision (Fig. 16) show in the right eye a failure from the lower temporal quadrant upward through the blind spot about to be met by a depression from above—just the reverse of the ordinary process as suggested in Case 2. Of this type we have had three examples. In the left eye the failure from above and below is about equally advanced as in Case 12. Both eyes show temporal islands to red disks.

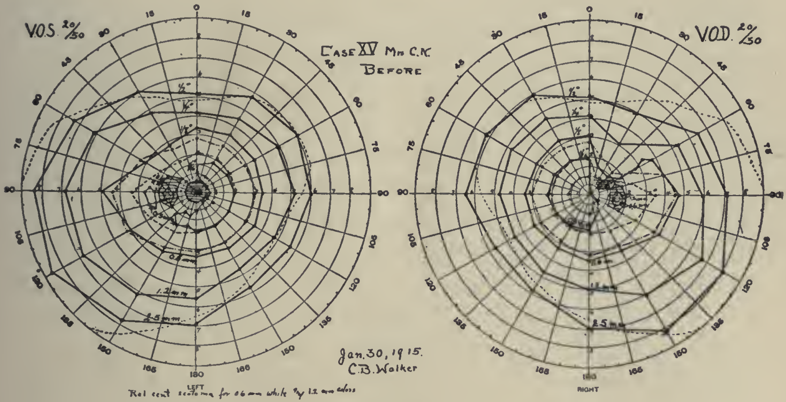

FIG. 14.

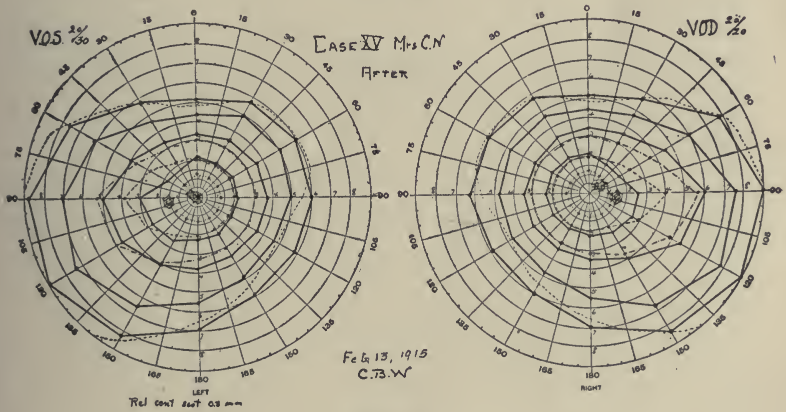

FIG. 15.

Fields of February 17, 1915, showed further advance of the same condition with failure of vision to V. O. D. $\frac{20}{40}$, V. O. S. $\frac{20}{70}$.

February 19, 1915. Transphenoidal decompression with removal of many fragments of the struma.

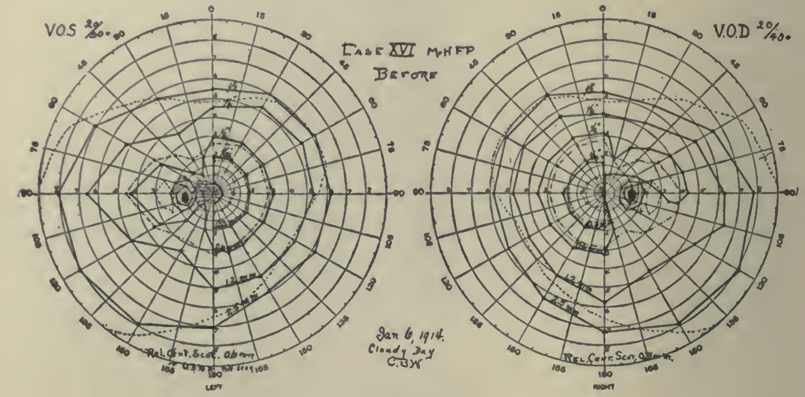

FIG. 16.

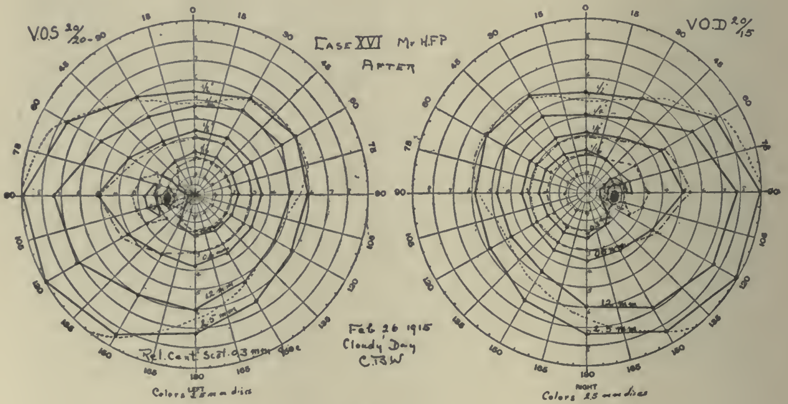

FIG. 17.

Fields, February 26, 1915, show a rapid progress to normal outlines with great improvement of central vision as is usually the result in very early cases. A temporal island for red has been recovered by the nasal field from above in the right eye but has only enlarged in the left eye with the appearance of a temporal island for the 0.3*mm* disk.

DISCUSSION.

(*Second Part.*)

We have taken considerable pains to outline our method of perimetry as much as possible in a short space, because so much depends on method and personal equation in these studies that it seems imperative. Our method has been found very satisfactory in controlling the time equation, and in determining diagnosis and prognosis as far as it is possible from the fields. Personal equations are probably best controlled by having the same observer take the whole series of fields or, if that is not possible, to have the same method used throughout. We have found it very desirable to have the complete examination recorded on one large chart and thus avoid the confusion of different scales on small charts.

In the very early cases it is notable that the predominate characteristics of the field defects to the small disks are similar to those seen in the later stages—that is, the defect is usually from above with the formation of a cæco-central scotoma and enlarged blind spot with a variable amount of defect from below. As in later stages the temporal island may be demonstrated both for form and color though it may not lie in the region later found to be the more resistant part of the field to the larger disks.

The centrally scotomatous and non-scotomatous cases appear in the early as well as in the more advanced cases. While it is quite possible that the presence of a central scotoma leading the field defect indicates a more rapid or extensive growth, it must also be remembered that the toxic œdematous products possibly resulting from a rapid and perhaps somewhat inflammatory strumous growth may also play a part in damaging the macular fibers so notoriously subject to such influences. Certainly it would not be remarkable if toxic and inflammatory products were formed in the presence of a growth producing pressure enough to cause disintegration of the bony sella turcica. The fact that one eye is usually damaged more than the other probably indicates primarily a lack of symmetry in the growth and secondarily a possible variation in the arrangement of the intertwined crossed fibers in the chiasma.

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Again we note that in both early and advanced cases the defect may be about equally advanced from above and from below toward the cæco-central region and occasionally it is seen to be predominately from below. These cases may doubtless be explained by a primary swelling of the struma upward and thence forward in a saddle-shaped manner against the optic tracts and chiasm, possibly in some cases then pressing more from above than from below in case no intertwining of chiasmal fibers accounts for it. Of course a supra-sellar growth may effect the same result. Among the numerous conclusions that may be drawn from a study of these cases the following seem particularly justifiable:

CONCLUSIONS.

1. In general, field examinations are not complete unless disks representing a large range of visual angles (from 1.7° to 8°) are used according to the requirements of the case.
2. Field defects found to the normal disk should be examined with a larger series of disks to determine as much as possible concerning the prognosis and status of atrophy or optic block.
3. Cases showing no defect to the normal disks should be examined with the smallest series of disks as a test for the earliest changes for diagnostic purposes.
4. Temporal islands of vision occur in these cases on and below the horizontal line in the region of 30° to 50° from the center; these islands probably represent the strongest part of the temporal field and add encouragement to the prognosis.
5. Response to large disks in a defective field is also of encouraging prognosis.
6. Cæco-central regions are the weakest part of the field, and field defects usually extend vertically through this region, more marked, as a rule, from above than from below.
7. Scotomatous cases may be the result of the hypersensitive macular or cæco-central fibers exposed to toxic as well as pressure effects of the growth.

I wish to extend my most grateful thanks to Prof. Harvey Cushing for his kind generosity in allowing me to present this particular phase of his cases.

KERATITIS CAUSED BY INFECTION WITH BACILLUS COLI.

By Dr. A. C. MACLEISH, Los Angeles, Cal.

IN the *Transactions of the Ophthalmological Society of the United Kingdom* for 1911 there appears a paper by Mr. Arnold Lawson on "Two Cases of Metastatic Ocular Inflammation Associated with Bacillus Coli Toxæmia." In the same publication for 1913 appears another paper by Mr. S. H. Browning urging the examination of the excreta in cases of inflammations of obscure origin, and mentioning the bacillus coli as a cause. In Mr. Lawson's paper the two cases reported of undoubted coli infection were cured by the administration of urinary antiseptics alone in one case, and in the other case by the additional administration of an autogenous vaccine made from a culture from the urine of the patient.

While in attendance at the Royal London Ophthalmic Hospital (Moorfields) in the early part of 1912 I had the opportunity, through the courtesy of Mr. Browning, of seeing a patient, a young girl, with a marked keratitis of both eyes of this same type, rapidly being cured by the injection of autogenous vaccine in addition to the administration of a urinary antiseptic internally.

Outside of the papers by Mr. Lawson and Mr. Browning I can find no mention of the association of the bacillus coli with affections of the eye, and yet it would seem to be not an uncommon occurrence, for, since November, 1912, I have come across no fewer than five cases in private practice. Each case showed a keratitis of a vesicular type accompanied by a chronic cystitis or recurrent diarrhœa or both. In each case a pure culture of bacillus coli was obtained from the urine of the patient, and in one case, seen in consultation, subsequently from the aspirated contents of the anterior chamber. I have accordingly placed them in the list of cases described by Mr. Lawson as being caused by bacillus coli infection.

This condition seems not to have heretofore been generally recognized, but as I rather suspect has been included under the head of dystrophy, because of its great resistance to the ordinary methods of treatment. However, as there have been certain peculiarities in the involvement of the cornea common to all the cases which have come under my observation, I will try to describe them so that perhaps others may add to the list of cases and establish the disease among the recognized affections of the cornea. I may here emphasize the plea of Mr. Browning in his paper: in all cases of affections of the eye of obscure origin, examine the excreta and particularly the urine of the patient especially for bacteria, and perhaps many of the cases which have proven such a source of worry and disappointment for surgeon and patient may be cleared up.

In the first place as to the subjective symptoms: In each case pain was not the chief complaint; rather the patient complained of constant discomfort, roughness and "scratchiness" of the eyes, and of failing vision. Also of slight photophobia and lacrimation. Sharp pain occurred only at certain times of which I will speak later. Almost all complained of a feeling as if there were a foreign body present, not stationary in location, but migrating, sometimes disappearing entirely.

The general appearance is that of a patient suffering from a mild keratitis: eyes half closed; disinclination to face the light, and more or less lacrimation.

On examination the conjunctiva of lids and globe are seen to be congested; the palpebral conjunctiva usually thickened and succulent-looking and slightly smeary on the surface. Seldom is exudate seen but often a frothy appearance at the canthi. Some circumcorneal injection shows; the pupils are generally contracted, but the iris seems little involved.

The cornea at first sight looks diffusely clouded and of a peculiar smeary appearance as though much-diluted milk had been spread over it; but having some more highly refractive circumscribed rounded areas scattered over the surface, few in number and discrete.

On focal illumination the anterior surface of the cornea in the involved area may seem to be covered over with numerous minute vesicles so closely placed as to give it a stippled or sanded appearance. The areas of higher refraction now show as small blebs in the corneal epithelium or as small depressions where blebs have spontaneously ruptured.

The only time when pain is complained of seems to be when the blebs are present, due doubtless to the stretching of the fine sensory nerve filaments in the epithelial layer. Patients seem always immediately conscious of the formation of the blebs and also of their rupture; one patient stating that on rupture there was a distinct feeling of a "click" on the eye followed by immediate relief from discomfort. While the bleb is present the sensation of a foreign body is most noticeable. Whether the larger blebs are formed by the coalescence of smaller vesicles or more spontaneously formed could not be ascertained. These larger blebs are usually discrete, seldom being seen in groups, and are commonly toward the central part of the cornea. As a general rule the vesicles are more densely placed in the lower half of the cornea, which in all cases seems to have been the first and most heavily involved. No actual ulceration has been noted, and the pitted area left by ruptured blebs was always clear.

On close examination by focal illumination the substantia propria is also seen to be peculiarly involved. The infiltration here seems to be more general and has a distinctly much-diluted-milk appearance, and the tissue seems somehow or other to give one the impression of being soggy, as though the lymph spaces were distended by a faintly milky fluid. In some cases the infiltration takes on a somewhat finely and irregularly striped appearance, with the tendency for the striping to assume more of a vertical than of a horizontal direction. The infiltration is not always entirely uniform, for often may be seen irregular areas of denser infiltration with no regular distribution or arrangement. These have sometimes a feathered appearance off the edges and, if one diameter is greater than the other, a teased-out appearance of the ends. These patches seem to be fairly deep in the stroma and at times seem to involve the whole thickness of it.

Deeper still can be seen at times a faint striation, apparently in Descemet's membrane, assuming a more or less horizontal direction, which I have supposed to be a wrinkling of the membrane on account of increased intrastromal tension due to lymph stasis in the substantia propria.

Finally I have thought in two cases that the aqueous was slightly turbid, but this could not be accurately demonstrated on account of the corneal involvement.

The youngest case seen was over 60 years of age and the oldest 78. The longest duration of the keratitis was seven years, and the shortest one year at intervals. In three cases there was cataract as a complication, one showing hypermature cataract with very poor light projection. Every case complained of chronic cystitis and three of chronic diarrhœa of irregular type. One case (male) had had "abscess at the neck of the bladder" evacuated by incision through the perineum, and stated that there was a considerable quantity of very foul-smelling pus. One case had been under treatment for years in various cities of the United States, with no relief. In each case the urine was cloudy and ill-smelling, and in every case B. C. C. were found by culture from catheterized urine; the catheterizing being done under all possible precautions to prevent external contamination. In three cases a pure B. C. C. culture was obtained; in the case which had had abscess a few colonies of an atypical streptococcus also showed. In one case brought to us for diagnosis a pure culture of B. C. C. was subsequently obtained from the aspirated contents of the anterior chamber. In two cases both eyes were involved, one usually more than the other; in three cases only one eye was involved, and peculiarly always the left eye more than the right. In three cases ordinary treatment over a variable period of time had no definite result, but in those three cases injections of increasing amounts of autogenous vaccine at intervals of five days, combined with urinary antiseptics and buttermilk diet, gave definite beneficial results. In all three cases the cornea cleared progressively from above downward.

CASE I.—Mrs. M——. Age 76. Recurrent keratitis of years' duration. Cornea never clear during this period. Has been under treatment in various cities of the United States, without any permanent relief. History of cystitis of many years' duration; urine of very offensive odor; pain and burning on micturition.

Both eyes involved by typical B. C. C. keratitis with bleb formation and many minute vesicles. Lower halves of corneæ are more involved than upper; although both corneæ are pretty generally involved.

A pure culture of B. C. C. was obtained from carefully catheterized urine.

Buttermilk diet and urinary antiseptics ordered. After four injections of autogenous vaccine, prepared from the culture made from urine (5,000,000–10,000,000–20,000,000 and 40,000,000) at five-day intervals, there was some clearing of both corneæ above; the pain and burning on micturition disappeared, and the urine was less offensive in odor.

Two subsequent injections were made of 50,000,000 each with only slight further clearing.

As the patient was quite frail and not satisfied with her improvement she discontinued treatment.

Case 2.—Mr. M——. Age 68. Complains of gradual failing of vision in the left eye with increasing irritation of that eye during the past year. Has had chronic cystitis with history of "abscess at neck of the bladder," which was evacuated by operation through the perineum a year ago. The right eye has some slight irritation but not to any extent.

Left eye shows typical B. C. C. keratitis with no bleb formation at time seen. Right cornea very faintly hazy. L. V. $\frac{3}{45}$. Some slight conjunctivitis shows in both eyes; more noticeably in the left eye. Left pupil contracted. Atropine (1%) used daily and lids swabbed with a solution of silver nitrate every third day for conjunctivitis. Boric acid solution ordered for flushing the eyes several times daily, and ung. holocain and adrenalin for irritation. No benefit at all was experienced after ten days' treatment.

A carefully catheterized sample of urine gave a culture of B. C. C. and one or two colonies of an atypical streptococcus.

After seven injections of autogenous vaccine 10,000,000 increasing to 100,000,000 (patient being on buttermilk diet and taking a urinary antiseptic), L. V. – $\frac{3}{9}$. Right cornea was clear; left, clearing rapidly from above downward. Little irritation; cystitis much lessened and urine clear and odorless and showed no organisms on culture.

Patient now left for home in the Eastern States, taking a supply of vaccine with directions to his physician for its use. Report one month afterward: still improving.

Case 3.—Mr. A——. Age 60. Recurrent keratitis in left eye, which has been blind for years with hypermature cataract. Very poor light projection; almost none. Cornea shows typical B. C. C. keratitis. Patient has chronic cystitis and diarrhœa. A pure culture of B. C. C. was obtained from his urine. As the patient did not wish vaccine treatment, numerous remedies were tried, including silver nitrate, yellow oxide of mercury in conjunction with atropine, and urinary antiseptics, with no relief. At patient's request, the eye, being sightless and very irritable, was removed. (It was intended to make sections and stain specimen in an endeavor to demonstrate bacillus coli in tissues, but unfortunately specimen was destroyed.)

Case 4.—Mr. B——. Age 78. An old Civil War veteran. Patient has had recurrent keratitis in left eye for four or five years, with chronic cystitis and diarrhœa. Incipient cataract right and left; left more mature. The cornea was entirely involved and there were many blebs. There was much irritation, photophobia, and lacrimation. Much pain was experienced with the formation of blebs. A pure culture of B. C. C. was obtained from urine. Urinary antiseptics were given. After three injections of autogenous vaccine (20,000,000–50,000,000–100,000,000) there was much relief; bleb formation stopped, and the cornea was clearing above, when he disappeared for three weeks. The patient then returned; his eyes were worse and there was again bleb formation. Three more injections were given with relief. He did not then return for six weeks. The eyes then were in the original condition. Subsequently he was very irregular in attendance and discontinued treatment.

Case 5.—Sent for diagnosis. Typical B. C. C. keratitis with bleb formation. Subsequently a pure B. C. C. culture was obtained from the aspirated contents of anterior chamber. As this case belongs to another surgeon I can make no report.

The bacillus coli may infest the bladder and intestinal tract for years without causing any systemic symptoms. The only explanation I can give of the fact of the eyes being at times affected by this organism, which as a general rule is so harmless, is that either the numbers of the bacilli become overwhelming, because of lowered bodily resistance from prolonged infection (all the cases having been of long standing as to the bacilluria), or that the bacillus increases in virulence, which is not unlikely when one considers how other organisms vary in toxicity under various conditions and surroundings.

I have been unfortunate so far in that the patients seen were all adverse or unable to go to the hospital where their daily habits and diet could be regulated, for I am quite sure that by such regulation and by more regular intervals between vaccine injections much better results could have been obtained.

From such a small number of cases little can be deduced; but it is hoped that this report may be of benefit and that in the near future reports of more cases with appropriate treatment may establish this peculiar and distinctive condition among our list of diseases of the cornea.

DOUBLE CHANCRE OF THE EYELID.[1]

BY PROF. C. E. FINLAY, OF HAVANA, CUBA.

(*With one illustration on Text-Plate XIII.*)

THE case which is the subject of this paper, apart from its rarity, presents several features of considerable interest.

CLINICAL HISTORY.

B. T., white, of Spanish nationality, æt. 40 years, a widow, and worker in a tobacco factory, presented herself at the Eye Out-patient Department of Mercedes Hospital of this city on February 25th of this year.

Family History.—Her father had died of yellow fever, her mother of some pulmonary complaint.

Previous Personal History.—She suffered from typhoid and whooping-cough in early childhood. She was married in 1894 when 19 years old and has had twelve children at term and three abortions, on one occasion having been confined of twins. Her husband died in September, 1914. The patient is most emphatic in assuring that since her husband's death she has had no sort of sexual relations with any other man.

History of Present Illness.—On December 16, 1914, whilst at work in the factory, she commenced to feel some slight discomfort, with intense itching and slight redness in the region of the internal canthus of the left eye. The next day all this region was inflamed, the pain being very pronounced. She consulted the municipal oculist, who prescribed hot boracic-acid compresses. She continued this treatment for eight days, the inflammation increasing in extent instead of diminishing, she then applied some home remedies such as

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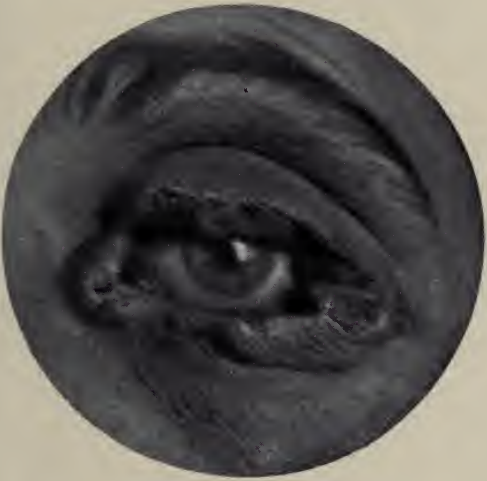
[1] Read at the session of the Havana Academy of Medical, Physical, and Natural Sciences of April 23, 1915.

ILLUSTRATING DR. FINLAY'S ARTICLE ON "A CASE OF DOUBLE CHANCRE OF THE EYELID."



tea decoction, etc. During all this time she kept up her work, she being able to devote only her spare moments to the attendance of her eyes. There was a good deal of lacrimation and at the factory she was constantly bathing her eyes in a basin used in common by all the employees, afterwards wiping them in a rolling towel in common use by some 200 employees. On January 7, 1915, on a single occasion she attended the Mercedes Hospital Eye Cut-patient Department. There then existed a focus of acute inflammation at the external canthus at the level of the lower lid; it presented a white spot from which a considerable amount of pus was squeezed out; a *hordeolum* which had spontaneously opened was diagnosed and hot applications during ½ hour prescribed. After a fortnight the symptoms were more pronounced. She again consulted the municipal oculist, who ordered a similar treatment to that prescribed previously. No improvement; the patient again presented herself at the Mercedes Hospital on February 25, 1915.

Status Præsens.—The left eye showed at the external canthus a large round ulcer about the size of a dime or a little larger, with sharply cut edges quite hard from the infiltration in the surrounding tissue; the floor of the ulcer was dirty and necrotic, covered by a puriform secretion. A similar ulceration existed at the inner canthus; its shape was irregular when the eyes were open, but when they were closed the circular appearance of the Hunterian chancre was quite manifest. There was a small round nodule of infiltration on the margin of the lower lid between the two sores; the collateral œdema of both lower and upper lids was considerable; there also existed some conjunctival œdema near the external canthus and some increased secretion and lacrimation. Both the pre-auricular and submaxillary lymphatic glands were inflamed. There were no mucous patches in the mouth or throat and no other secondary manifestations.

The patient was admitted to the wards of Mercedes Hospital on February 26th, a wet dressing applied with spraying of the sores once a day for fifteen minutes with a 30% hydrogen peroxide solution. Two days later an examination of the infiltration at the base of the sore at the external canthus for spirochæta pallida with the ultramicroscope proved negative. A like result was obtained in a second examination made ten days later; the Wassermann test also proved negative. A third examination for the spirochæta at the end of another week proved positive; the Wassermann test also was positive at this time. Some two or three days later mucous patches appeared in the mouth and throat. On March 27th a first injection of 30*ccm* of Ehrlich's neo-salvarsan was applied, the sores rapidly melted away, and the patient was discharged on April 17th, after a second injection of 45*ccm* of Billon's novo-arsenobenzol on the 15th.

REMARKS.

The *frequency* with which this affection occurs varies greatly, according to different authors. In the literature at my disposal, I have found reports of about 100 cases, and from reference made to statistical reports compiled at intervals by different writers the total summing up of cases seems to be in the neighborhood of 500.

Willbrand and Staelin (67) in 16,616 cases of syphilis, in 307 of which the primary sore was extragenital, do not mention a single case of chancre of the eyelid. Peppmüller (81) finds the proportion of chancre of the eyelid as 4 to 5% of other extragenital chancres. Lesser (29) in 201 cases of chancre found 16 extragenital, one of these being situated in the eyelid. Talbot (52) found 3 cases of chancre of the eyelid in 434 cases of syphilis. Neumann (39) found in literature 162 cases of lid chancre among 613 extragenital ones, having personally observed 2 in 86. Prosek (65) found 2 cases of ocular chancre, one on the lower eyelid, in 469 cases of extragenital chancre. Nivet, quoted by Mohr (70), in 595 cases of extragenital chancres found 413 in the head and 15 in the lids. Fortuniadés (38) compiled 118 cases from literature. Ziessl (4) found 8 cases of lid trouble in 40,000 cases of syphilis. Alexander (61) found 247 cases of chancre of the lids in 931 extragenital cases. Muncheimer (66) places it in the seventh place among the extragenital chancres, after the lips, breast, mouth, finger, hands, and tonsils. As a rule it is, however, granted the third place after the lips and finger [Knies (45), Michel (94), Gruder (70)]. Porey Koschitz (40) in 852 cases of extragenital chancres found 132 in the eyes, most frequent after lips. Tepljachin (30) and Pospelow (36) found from 15 to 25% of the population of two Russian villages thus affected.

In Cuba this is the first case reported. Santos Fernandez (97) in a recent paper on his personal experience with ocular syphilis mentions in one of his tables No. 19 a case of chancre of the lid; his tables deal with 1697 cases of ocular syphilis in 50,250 eye patients. Dr. Santos Fernandez has explained to me that he did not see this case while the chancre was present, but that he saw the patient several years later when the chancre had healed, his data having been obtained from the patient who on the occasion of his primary sore was seen and treated by Dr. Cervera of Madrid.

The *mode of transmission* also presents considerable variety: thus we find in some cases auto-infection as the cause [Holth (56)]; in others some near relatives were previously affected with syphilis [Uhthoff (76), Jessop (60)]; doctors have also acquired lid chancres in the treatment of throat cases [Desmarres (1), Fournier (2), Alexander (69)]; in a few cases we find the cause of the lesion in the habit of the peasantry of treating eye troubles by licking them; in some villages in Russia as great a proportion as 15 to 25% of the population have been known to thus acquire lid chancres [Tepljachin (30), Pospelow (36), Poljakow (47)]; in one case an infant acquired a chancre of the eyelid due to the habit of a syphilitic nurse of cleansing its eyes with saliva [Baudruy (18)]. The affection has had its origin in kissing [Gazzard (68), Weber (83)]; Monzutti (86) ascribes the infection to contamination of the street mud by spitting; in some cases the eyes were previously inflamed, the syphilitic infection appearing as a secondary contamination [Michel (77), Helbron (72), Blichahn (40)].

In our case the patient assures us most emphatically that she has not had any sexual relations since her husband's death in September, 1914; at the same time she explains that at the tobacco factory where she works from 100 to 200 women at the end of each day's sessions wash their hands and faces in the same basins and dry them with the same towel, which habit easily explains the manner in which the infection occurred. It is not, however, quite clear whether the patient originally had a hordeolum which was secondarily inoculated by an infected towel, or whether what was originally taken for a hordeolum was in reality an as yet undeveloped chancre. In favor of the first view are the acute onset of the affection, and the length of time which elapsed between the appearance of the first symptoms and the lesion acquiring its typical aspect (two months) and the breaking out of the secondaries another month later. In favor of the second is the non-existence of any break in the symptoms of one and the other affection.

The clinical appearance of the sore when seen for the second time on February 25, 1915, was typical and could not be confounded with anything but an ulcerated gumma. The negative results of the two first examinations for the spirochæte with the ultra-microscope can be explained by the fact that the serum extracted from the base of the sore in these two instances was not examined till after several hours had elapsed, whilst in the last positive examination the examination was made on the spot. The negative Wassermann before the appearance of the secondary manifestations seems to me to be in order, the abeyance of hæmolysis coinciding with the presence of mucous patches. In the first examination leicithin was employed in place of the antigen, whilst in the last instance the antigen used was obtained from syphilitic fetal liver.

Among the clinical features of the case, one of the most interesting is the double lesion, at the inner canthus and outer commissure. In literature I have found eight other cases of double chancre[1] and one of triple chancre.[2]

The pre-auricular and submaxillary glandular enlargements depend on the site of the two chancres. Most (90) describes the lymphatics of the lids as arranged in two networks: (*a*) a superficial one between the skin and the orbicularis and (*b*) a deeper one in the substance of the tarsus, the two intercommunicating. The lymphatics of the conjunctiva run along the free margin of the lids. Both the superficial and the deep lymphatics are divisible into a lateral and medial group; the former lead to the preauricular lymphatic glands over the parotid, the latter to the submaxillary. The area of origin of the superficial lateral group comprises almost the whole upper lid and the outer half of the lower lid, the glands to which they lead lying over the parotid at the level of the external auditory meatus, and two to three which are found just below the inferior pole of the parotid and in reality belong to the cervical glands. The deep lateral group originate in the conjunctiva of the upper lid and external ⅓ of the lower lid, the glands to which they lead being situated in the substance of the parotid. The superficial medial group arise in the integument of the inner ½ of the lower lid and of the inner canthus; they lead to the submaxillary lymphatic glands which are situated internally to the facial vein close to the border of the inferior maxilla. The deep medial group originate in the inner ⅔ of the conjunctiva of the lower lid and in the caruncle, and travel along the facial vein to the submaxillary glands which lie externally to those above mentioned. All these lymphatics lead up to the cervical glands which surround the internal jugular vein. Poitoux (63) had previously called attention to the clinical fact that chancres situated on the outer portion of the eyelids were accompanied by enlargement of the pre-auricular lymphatic glands and those on the inner portion by enlargement of the submaxillary.

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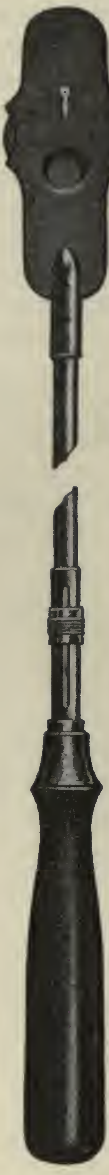
[1] Fournier (2), Pfluger (7), Morel Lavalée (27), Coppez (54), Gallemaerts (62), Seydel (71), Helbron (72), Manzutto (86).

[2] Kornacker (87).

In our case we find a nodular infiltration between the two chancres such as is described by Michel (3) in the neighborhood of lid chancres.

The extraordinarily ready response to the arseno-benzol treatment was also quite remarkable.



A FORM AND COLOR TEST OBJECT FOR PERIMETRIC WORK.

By LUTHER C. PETER, A.M., M.D., F.A.C.S.,
Philadelphia, Pa.

(*With one illustration in the text.*)

THE growing popularity of the campimeter over the arc perimeter for central field study has created a new necessity in the form of a suitable test object for working out the refinements of indistinct and relative scotomata. The Bjerrum stick and modifications are well adapted. It necessitates, however, a large number of test objects of varying size and colors, some of which may become lost or destroyed.

For the routine blackboard work in hospitals and offices I have devised a form and color test which the De Zeng Standard Company list as "A Daylight Hand Color Test for Perimetry." It consists, as shown in the illustration, of a small oval disk in which are contained white, red, green, and blue disks in sizes varying from one and a half to ten millimeters. The changing of the colors is controlled by a small slide in the handle, and the size of the disk is regulated by a milled wheel in which the varying sized diaphragms are contained.

The advantages to be gained by having the instantaneous shifting of the colors under the control of the operator without the patient's knowledge of a change, is obvious. The advantage also of combining twenty different test objects in one instrument for rapid work is also apparent. The size of the instrument and its necessary clumsiness when contrasted with a small Bjerrum stick, however, does not make it any the less useful in making the average campimetric study, and it may be employed advantageously and conveniently for refined work. The instrument may also be used with equal facility on an arc perimeter of any variety. The average self-registering perimeter is easily and frequently broken. Under such circumstances, the author's test object may be used.

No originality is claimed for the instrument other than the working out of the details which have made *multum in parvo* possible.

CONGENITAL DIVISION OF THE OPTIC NERVE AT THE BASE OF THE SKULL.

By C. M. SNEAD, M.D., Jefferson City, Miss., U. S. A.

(*With one illustration in the text.*)

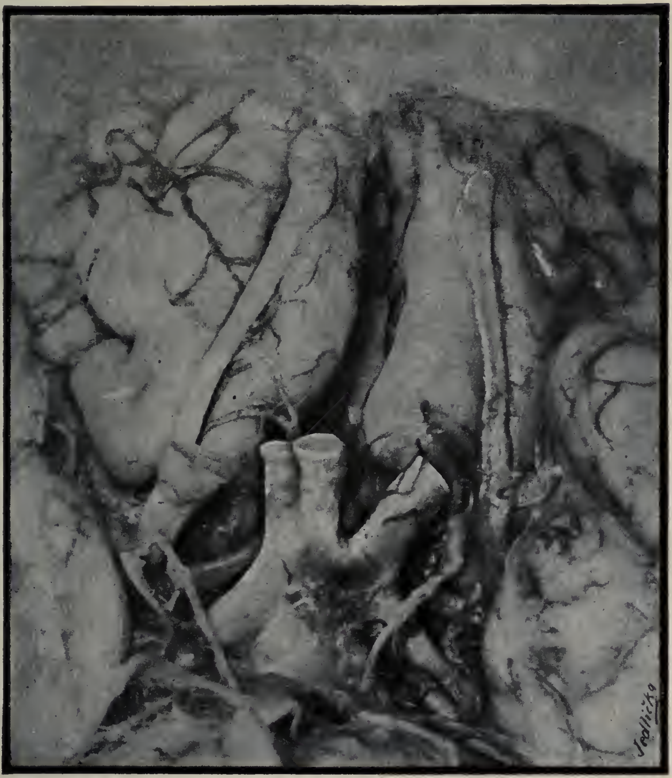
Trans. from the *Archiv f. Augenheilkunde,* Vol. LXXVI., 1914.

THE following anomaly in the optic nerve is of interest in a study of the course of the fibers:

P. J., 66 years of age, was admitted to the medical clinic on account of cirrhosis of the liver with complications, and died after two days. An examination of the eye-grounds was not made. At the autopsy the following anomaly was discovered. The right optic nerve divides in front of the chiasm at a distance of about 6*mm* into two parts, of which the one situated on the temporal side measures about 2½*mm* while the nasal one measures 4*mm*. As these two parts approach the eyeball they again unite to form a round strand which seems to be perfectly normal.

The entire right optic nerve from the eyeball up to the geniculate body, including the chiasm, was divided into ten parts for microscopic examination. These were hardened in Mueller-formol and imbedded in celloidin. The first four segments, those next to the eyeball, showed no pathologic conditions. Commencing with segment 5, the lateral band commences to appear. It consists of perfectly normal nerve fibers separated from the rest of the nerve by a connective-tissue sheath. This separation is complete in parts 5 and 6, and the two optic nerves appear completely separated for 6*mm* where each nerve-fiber bundle has a complete connective-tissue sheath. In the proximity of the chiasm slight projections of the perineurium can be seen invading the right tract. The two tracts appear entirely normal. The separation of the optic nerve into two bundles is a great rarity.

Of particular interest are the cases, of which three have thus far been published, where the separated optic-nerve bundle can be traced uncrossed along the optic nerve. A case in point was published by Ganser, where an uncrossed bundle



could be followed from the external geniculate body to the optic nerve. In the region of the optic nerve as well as of the tract it unites with the other fibers and can not be traced any farther.

The second case was reported by Schlagenhaufer, in which there was a white bundle situated on the right side of the optic tract, appearing above the right internal geniculate ganglion as a band 3.1*mm* broad. It then became attached to the internal surface of the external geniculate body and followed along the internal side of the tract. Directly in front of the chiasm it formed a loop crossing over the chiasm, and joined the external surface of the right optic nerve, where it formed an isolated solid bundle measuring 6*mm* in diameter. It entered the optic foramen together with the optic nerve and finally joined the optic nerve at its lower surface, although it could be traced as a white bundle up to the entrance of the optic nerve into the eye.

In Fuchs's case an isolated bundle was first found in the optic nerve, and in the orbital portion joined the lower periphery of the optic trunk.

In these three cases, according to Schlagenhaufer, the isolated bundle followed the anatomic course of the uncrossed optic-nerve fibers.

In our case it was not possible to isolate the strand any farther than the chiasm, so that we can not definitely say whether it represented the uncrossed optic-nerve fibers of the right side, though its analogy with the previously reported cases makes this supposition probable.

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ON THE PATHOLOGY AND TREATMENT OF CERTAIN DISEASES OF INTERNAL SECRETION.

(BASEDOW'S DISEASE, TETANY, AND ACROMEGALY.)

By Prof. SCHOENBORN, Heidelberg.

Translated from *Arch. f. Augenh'lk.*, Vol. LXXVII., 1914.

DISTURBANCES in the organs of internal secretion generally produce pictures of intoxication which influence functionally the autonomous and sympathetic nervous systems. The eye symptoms which are observed in connection with these diseases can only in part be regarded as symptoms of intoxication. It is possible to consider zonular cataract occurring in tetany as a part of the disturbance in calcium metabolism and the exophthalmus in Basedow may be regarded as a toxic symptom. On the other hand, the eye symptoms in acromegaly are exclusively the result of mechanical conditions within the skull. Other disturbances in this group are not associated with eye symptoms: myotonia, myatonia, paralysis agitans, Addison's disease.

The pathogenesis of all of these symptoms is still unknown. The three above-mentioned diseases have in common that they show the result of a hyperfunction rather than of a defect of the individual glandular function (thyroid, parathyroid, hypophysis). We think of defective inhibitions and call the substances which represent these inhibitions, inhibitive irritative substances, or inhibitory hormones. One of these is adrenalin, which has an elective action on the entire sympathetic nervous system. It seems possible that each one of these hormones has a functionally antagonistic substance of chemical nature, such as alkalies and earth alkalies—Ca., Mg., K., Na.—, which, according to Jacques Loeb, are necessary for the action of many nerves, muscles, and glands. In the clinically recognizable diseases of this group we rarely have to deal with a change in the quantitative variations of the glandular activity; as in Basedow's disease it is not a supersecretion or a superfunction, but rather a qualitative change, a dysthyriosis. On this point the opinions are still divided. It is generally accepted that Basedow has a thyroid origin, usually in the form of a hyperthyriosis. Many regard it as an expression of hyperthyriosis with a simultaneous qualitative change, a dysthyriosis. I have never known a case of Basedow's disease with normal thyroid gland. Hyperthyroidism seems plausible from the hypertrophy of the organ, its increased vascularization, the increased metabolism of the patient, with increased excitability of all nervous organs, and finally the possibility of producing symptoms similar to Basedow through the administration of thyroid gland and the healing of myxœdematous symptoms by this treatment. Increased secretion of the gland does not produce any recognizable histological changes in the cell body. Straight cases of Basedow have not been produced in animals. Basedow-like symptoms have been produced in animals treated with the thyroid juice from Basedow patients. These symptoms have also been produced by the feeding with ordinary strumas or the implantation of thymus. The possibility of producing Basedow by feeding with iodine is more a sign of dysthyriosis than hyperthyriosis. The myxœdematous symptoms in the same patient suggest a dysthyriosis. The final solution of this question is still far from solved. We can assume that there is a primary disease of the thyroid gland with change in its secretion; that it is a secondary disease due to primary changes in the sympathetic system is extremely improbable, particularly, as we find in Basedow's disease both vagus and sympathetic symptoms, though not to the same degree. It seems to me that cases strictly belonging to one or to the other category do not occur and that the mixed forms preponderate. The symptoms of vagus hypertonus—that is, belonging to the autonomous system—are: widening of the palpebral fissure, Graefe's symptom, disturbances of the respiration, diarrhœa, hyperacidity. Sympathetic symptoms are: exophthalmus, Stellwag symptom, lacrimation, tachycardia, increased vasomotor excitability, increased adrenalin, increased blood pressure.

If we now turn to the eye symptoms, we find that exophthalmus, the most characteristic and most difficult to explain, is absent in true Basedow in over 20% of the cases (Sattler). If the cases of "Basedowoid" and the so-called cases of thyroid heart be considered, this number is still larger. The thyroid heart has usually no exophthalmus. It is difficult to understand that the lid symptoms are partly sympathetic and partly autonomous. Both varieties occur together. There are other eye symptoms which can not be explained: disturbances of accommodation, changes in the retinal vessels, optic neuritis, and defects in the visual field, diminution of sensibility of cornea and conjunctiva, corneal ulcers, ophthalmoplegia, and bulbar paralysis. Many of these are probably due to a toxic neuritic process. The eye symptoms in Basedow do not give us any information as to the course, the stage, the variety, or the prognosis of the disease. The other main symptoms, such as those referring to the heart, the nervous system, and metabolism, are very much more important. According to Topolanski, of the eye symptoms, the lacrimation, the blurred vision, the dryness of the conjunctiva, the local injection and cyanosis of the conjunctiva are regarded as beginning symptoms. The late symptoms are: venous swelling, arterial pulse, and œdema of the lids.

Sattler accepts the old view that the exophthalmus is due to a serous transudation of the orbital tissues, an œdema produced by vasomotor changes. He does not regard it as due to a muscular spasm, as was accepted for a time after the investigations of Landström. The associated widening of the palpebral fissure is undoubtedly due to a hypertony or spasm of the elevator of the upper eyelid. Fründ regards the venous hyperæmia as an important factor in producing the exophthalmus and believes that this can result from the compression of the venous branches from muscular spasm. One-sided exophthalmus, of which there are a hundred cases on record, does not help us in finding the cause. The so-called "Glanzauge" of many of the incomplete Basedow and the cases of thyroid heart should be regarded as a mild stage of exophthalmus. The lack of association between the lid and the eyeball movements on looking down (Graefe), and the insufficiency of convergence (Möbius), are probably conditions of muscular spasm.

The cause of Basedow's disease is in most cases unknown. Some attribute it to trauma, both psychic and somatic, others to infectious diseases, primary thyroid disease, finally to intoxications, especially with iodine and thyroid preparations and possibly enterogenous auto-intoxication. There can be no question that other organs with internal secretion may be affected at the same time. Attention has recently been drawn to the relation of the thymus to Basedow. In the well-marked Basedow a large thymus is present in 80 to 90% of the cases. Basedow has been produced experimentally by the implantation of thymus tissue; but thymus and the status thymolymphaticus do not produce Basedow's disease, but simply aggravate the condition and change the character of the blood. The preponderance of Basedow's disease in women suggests a relationship to the germinal glands.

Treatment is as indefinite as our knowledge of the causes of this disease. In certain cases, removing the tumor of the thyroid gland or operating for acute struma, or the removal of injurious agent, such as iodine or thyroid preparations, relieves the conditions. The views on the value of iodine treatment have varied greatly. As is well known, at the present time iodine treatment has been universally abandoned. In a few cases iodine may have relieved some of the Basedow symptoms. Very much more frequently the symptoms are aggravated. We find an increase in the tachycardia, in the tremor, the diarrhœa, the eye symptoms, and loss of weight. Particularly injurious is iodine in the cases with pronounced heart symptoms with a degeneration of the heart muscle. It is particularly important to realize that the action of the iodine is entirely incalculable. In certain cases and in those without any symptoms of Basedow, iodine can in a short time produce characteristic Basedow symptoms. The unfavorable action of thyroid preparations has frequently been observed, especially where in mild Basedow this treatment was followed for the purpose of reduction in weight. A rapid increase in the thyroid symptoms was usually the result. Thyroid treatment should be used only in cases of a combined Basedow and myxœdema. These cases are far from unusual. Sattler has collected a large number of them. Certain symptoms are common to both diseases, such as œdema, dryness of the skin, loss and turning gray of the hair, mononucleosis. Of great interest are the cases where pronounced Basedow symptoms, often with a diminution of the tachycardia and of the eye symptoms, change to the characteristic mental dullness with drowsiness, general pallor, and œdematous condition of the skin and of the tongue. I have treated two of these cases for months with thyroidin with benefit until the Basedow symptoms again preponderated. It is perfectly proper to regard these cases as examples of disthyriosis with a tendency to hypothyriosis.

Treatment with antithyroidin, the serum of thyrodectomized oxen, or with rodagen, the milk of thyrodectomized goats, is harmless. In the mild cases these serotherapeutic treatments show excellent results. Treatment with preparations derived from the adrenals, ovaries, and thymus have been less successful. Surgical treatment is regarded by most surgeons and many internists as the surest radical treatment in all cases of Basedow's disease. I do not consider this to be correct. The opinions that have led to this have doubtless been influenced by the large statistics of certain surgeons, such as Kocher and Rehn, of whom the former has operated upon 535 cases, with mortality in 1.3% and recovery in 76%. These figures are surely much more favorable than those of other statistics, but they in a great measure apply to cases in the incipient stage. Other statistics are less favorable: von Eiselsberg, mortality 8%, recovery 30%; Klose, mortality 7%, recovery 64%; Westermeyer, mortality 14%, recovery 21%; Baruch, mortality 16%, recovery 37%. In the large discussion on this subject in Budapest in March, 1912, it seemed that the opponents to the operative treatment were distinctly in the majority. It is certain that the mortality is fairly high and that relapses after operation and other undesirable conditions are not infrequent. Many internists do not regard the mild cases as suited for operations, while some surgeons regard these as particularly suited to operation, and others consider compression symptoms as the only absolute indication. It is quite certain that in many of the mild cases and in cases of moderate severity treatment with internal means is safest, though complete recovery is not as frequent as after partial extirpation. If, on the other hand, the symptoms rapidly augment after a number of months of medical treatment, the operation should be undertaken. It goes without saying that only a partial extirpation of the thyroid should be performed. The improvement of the general condition, complete bodily and mental rest with climatic treatment are very important. Diet should be of a restricted meat with plenty of carbohydrates and fats, fruit, phosphates, and nucleoproteids. The drinking water should be free from iodine. Open-air cures in moderately high altitudes, from 500 to 1000 meters, are always of benefit.

Of the medicines, the bromides are generally recommended and are indispensable for restlessness and sleeplessness. I consider that arsenic in the form of elarson is valuable. Cardiotonics, valerian with bromides, strophanthus and the mild digitalis preparations are of value. Some recommend electricity, high frequency currents, and others have seen good results from the treatment with X-rays.

The eye symptoms in Basedow can be influenced by treatment to a surprisingly small degree. Nearly all observations have shown that the exophthalmus and the lid symptoms are the last to disappear. The operation, according to most surgeons, also exerts but little influence on the eye symptoms. My experience with medical treatment is the same. The results of course in the "Glanzauge" and in the thyroid heart are much better. The operative removal of the outer orbital wall with subsequent canthorraphy, according to Dollinger, in cases of exophthalmus with threatening corneal ulcer, is rarely to be recommended.

PARATHYROID DISTURBANCES are usually of little interest to the ophthalmologist except for the not infrequent association of zonular cataract with tetany. This association is not definite, especially as the connection between parathyroid disease and spasmophilic and tetanic symptoms is still vague. It seems that tetany and spasmophilia are similar diseases. Though tetany appears in sucklings, nursing mothers, gastric sufferers, those following the occupations of tailor and shoemaker, particularly at certain times of the year, with intermittent spasms of the flexor group in the extremities, frequently associated with psychoneurosis, and spasmophilia is characterized by a tendency to laryngeal spasm of rachitic children, there is one feature in common, namely, the mechanical and the electrical over-irritability of the motor and sensory nerves.

It is probable that both of these diseases are due to a functional disturbance of the epithelial bodies. This was proven by the recognition of the parathyriopriva tetany (postoperative tetany) which occurs after operations on the thyroid gland where the epithelial body was also extirpated. The condition was produced experimentally in animals, and true tetany was observed with the above symptoms and many characteristic trophic disturbances,—lack of dentine ossification, disturbance in the development of bones, degeneration of the liver and kidneys, and in one case in the development of a cataract in a rat. The extirpation of a part of the epithelial body has produced the so-called latent tetany, which under favorable conditions develops into active tetany after maternity or after certain poisons. The examination of the epithelial bodies has not given many results. The bodies were found normal, sometimes atrophied. In the cases of spasmophilia of children a decided change in the epithelial bodies was also not found. It seems as if the epithelial bodies are sometimes not the only cause of these symptoms, and it is probable that these conditions are evidences of a hypoparathyroidism. As far as I can judge, the condition may be regarded as a toxicosis which is due to an insufficiency of the epithelial body.

Recent investigations on calcium metabolism are of particular interest in connection with the etiology of tetany and spasmophilia. It seems fairly definite to assume that after the extirpation of the parathyroids the calcium in the blood and in the brain is reduced. Jacques Loeb has suggested that the calcium ions reduce the neuro-muscular irritability. The investigations on calcium metabolism in tetany, spasmophilia, and in epilepsy have led many authors to regard the lack of calcium as the principal symptom which is made probable by the combination of tetany with osteomalacia and the association of spasmophilia with rickets. This has been particularly supported by the benefit derived from the therapeutic use of calcium. In any case, most authors now recognize a relation between tetany-spasmophilic disturbances and calcium metabolism.

The eye symptoms in tetany are not very frequent, but are of interest. They usually consist in a variety of cataract which is not very frequent in true tetany and is very unusual in spasmophilia. The zonular cataract is the most frequent form observed. As is well known, zonular cataract occurs under other conditions. Hess regards it as a sign of developmental disturbance and draws attention to the frequent association of cataract formation in patients who have suffered from convulsions. According to Bach, rickets is present in about 80% of cases with zonular cataract. On the other hand, in only a small proportion of rickets is a zonular cataract present. Associated with this condition are the rachitic changes of the teeth. The changes of the lens occur in those lens fibers becoming clouded which are formed at the time of the rachitic nutritive disturbances. When these disturbances cease, normal lens fibers are again developed. According to my own investigations, zonular cataract is not very infrequent in tetany. Out of 41 cases zonular cataract was present in 4, a diffuse cloudiness of the lens in 1, and in 3 other cases of zonular cataract latent tetany was present. This suggests that an insufficiency of the epithelial bodies causes a disturbance of nutrition of the lens in tetany which does not develop unless there is a congenital predisposition.

The treatment of tetany has been brought into a new stage through the many investigations on calcium metabolism. The older methods of treatment consisted in a strengthening of the nervous system, combined in children with an energetic treatment of the rickets and in the systematic use of sedatives. These consisted in rest cures, hydrotherapy (protracted warm baths), over-feeding, galvanization of the sympathetic nerve, the central organs, and the peripheric muscles, arsenic, and in rickets, cod-liver oil with phosphorus. The best remedy for the convulsions are the bromides and occasionally general narcosis in spasmophilia. This treatment has often influenced favorably the attacks, though rarely has caused recovery. Recovery usually took place through the termination of pregnancy or lactation, the recovery from the rickets, and the change of time of the year. Gastric tetany is often cured by operation. In post-operative tetany organotherapy has been tried. This has unfortunately not been successful in man, and it seemed immaterial whether the gland or the extract was used. Some result has been obtained by the transplantation of epithelial bodies in man and in animals. It is to be remembered, as Biedl has emphasized, that the loss of an epithelial body for this purpose may cause the development of tetany in the donor.

The good result of the administration of thyroid extracts in tetany is very remarkable and is used, according to Kocher, regularly in post-operative cases and in other forms of tetany. An attempt should be made in every case.

Treatment, as a rule, gives better results in the true chronic tetany than in the spasmophilia of small children. In recent years the calcium treatment has been tested in the spasmophilic diathesis. Unfortunately the results with calcium treatment have not produced a single distinct success. The results in spasmophilia are somewhat better. In the acute attacks the electric excitability can usually be reduced and the convulsions stopped. Unfortunately these results are usually not permanent. Of just as much importance in infantile spasmophilia are dietetic and symptomatic measures: human milk, reduction of cow's milk and the carbohydrates, cod-liver oil, phosphorus, possibly chloral enemas. In tetany we often find a pluri-glandular insufficiency and in the combination of osteomalacia and tetany, adrenalin has been of service.

As to the eye changes in tetany, it has not been possible to influence cataracts through conservative measures. The operative treatment is the only one.

In ACROMEGALY the conditions concerning the etiological connection of the eye disease are quite different and the therapeutic side of the disease is of much greater importance. It is to be remembered that affections of the hypophysis without acromegaly, according to Uhthoff, more frequently lead to visual disturbances than acromegaly. The pathology of the hypophysis has been very much advanced during recent years.

Disease of this gland causes not only acromegaly as first described by Pierre Marie, but also gigantism, dystrophia adiposogenitalis, diabetes insipidus, and a number of other symptoms. The kind of disturbance produced depends upon the segment of the gland affected. It is to-day clear that in acromegaly the anterior lobe of the hypophysis undergoes a hypertrophy with which there is a simultaneous increased activity of the internal secretion. In gigantism, hyperpituitarism is also present, except that the condition develops during the period of growth, while acromegaly occurs after the completion of growth. On the other hand, the dystrophia adiposo-genitalis represents a hypopituitarism, a diminution of the secretion especially of the middle lobe, the pars intermedia. The posterior lobe consisting of indifferent glia tissue has probably no internal secreting function. The rare cases of acromegaly without changes in the hypophysis and of hypophysis tumor without changes in the growth and metabolism, are still unexplained and may depend upon an influence exerted by the other glands of the body. On the other hand, a combination of over- and under-function of the anterior and middle lobes may produce still other pathological pictures, as, for instance, a combination of acromegaly and hypophysial adiposity, dwarfism, and chondrodystrophia. The secretion and extracts of the hypophysis have physiologically a vaso-constricting action with increase in blood pressure. They also cause contractions of certain muscular structures (heart, uterus) and probably increased diuresis.

The chief effects of altered internal secretion of the hypophysis are changes in the growth in disease of the anterior lobe, changes in metabolism and genital hypoplasia and increased diuresis in disease of the pars intermedia. The clinical symptoms of acromegaly consist in an enlargement of the extremities of the body, glycosuria, polyuria, genital changes, a distortion of the sella turcica. The principal symptoms of gigantism consist in the general increase in length of the bones with retarded development, atrophy of the germinal glands, glycosuria. The chief symptoms of hypophysial adiposity consist in a rapidly developing obesity with infantile genitals and symptoms of a brain tumor. It is of great interest to note that recent investigations have shown that tumors of the anterior lobe which lead to acromegaly are never malignant but are true adenomata comparable to the struma. In diseases of the posterior lobe we find rapidly growing tumors of every variety.

In all diseases of the hypophysis, especially in acromegaly, and in the dystrophia adiposo-genitalis, eye symptoms frequently occur. They are not to be regarded as the effect of intoxication from glandular disturbance, but are always the result of pressure, tumor symptoms. These consist in amblyopia and amaurosis, temporal hemianopsia (very rarely homonymous or binasal), choked disk, optic neuritis, optic atrophy, disturbance of the field of vision, retinitis, iritis, cataract, motor paralysis, nystagmus, exophthalmus, and visual hallucinations. In true acromegaly the hemianopsia is the most frequent symptom. The other symptoms occur in the other form of hypophysial disease. Bogatsch has collected 315 cases of temporal hemianopsia. Of the more recently examined cases hypophysial disease was present in 50%; 13% were without etiology, which shows that bitemporal hemianopsia is frequent in hypophysial disease and that hypophysial disease is the most frequent cause for hemianopsia. De Klejn emphasizes the frequency of choked disk and blue vision.

Prognosis in acromegaly as to sight is not necessarily very poor. Even in pronounced acromegaly cases death or blindness does not necessarily occur in a short time. Improvements in vision are not unusual. Uhthoff states that early blindness is very unusual and that vision and the field of vision may spontaneously improve. In one of his cases complete amaurosis changed to a hemianopsia which remained stationary for a long time and persisted for nine years. Cases have been reported where the stationary feature has even been of longer duration, though complete recovery does not occur.

Treatment was without result until the operative removal succeeded. The two methods are the older intracranial method and the more recent transsphenoidal method which is particularly practised by O. Hirsch (endonasal modification of Schloffer's nasal method.) Hirsch has recently reported on 26 cases which were operated on with only three fatal results, in the majority with improvements of some duration.

Von Eiselsberg has reported on 16 cases, 15 of which showed eye symptoms in whom 4 died from meningitis. In the others the headache and the visual disturbances were improved, though the tumor could not be removed radically. The mortality can therefore be put at 25%, which is important for the ophthalmologist, because the patient usually consults him on account of loss of light.

Organotherapy has generally been without result. Some have reported a few successes with thyroid preparations. Hypophysial extracts have given no result.[1]

Our position as regards hypophysial disease is about as follows:

If the tumor symptoms are not marked and the visual disturbance progresses slowly, wait. General building-up, attempts with thyroid and the germinal glandular tissues, are indicated; treatment with X-ray. The operation is only to be recommended in threatening blindness or on account of insufferable subjective symptoms. The many relations which the hypophysis has with other organs of internal secretion suggest a consideration of the pluri-glandular symptom-complex. The use of hypophysial extracts in obstetrics and the unusual onset of acromegaly after castration belong here. "Functional and anatomical alterations of the hypophysis are associated with changes in the thyroid glands, in the germinal glands, and possibly in the adrenals. On the other hand, altered activity of the thyroid gland and the germinal gland and of the adrenals may cause anatomic changes in the hypophysis" (Biedl).

The complete recent literature will be found in the German original.

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[1] Surprising improvement in vision has followed the hypodermic injection of pituitary extracts in some cases.—*Editor.*

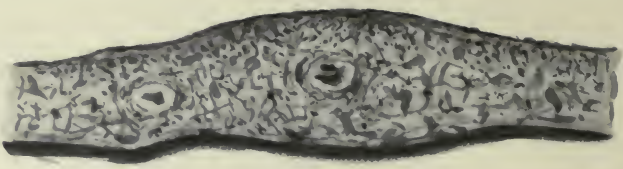

Fig. 1.

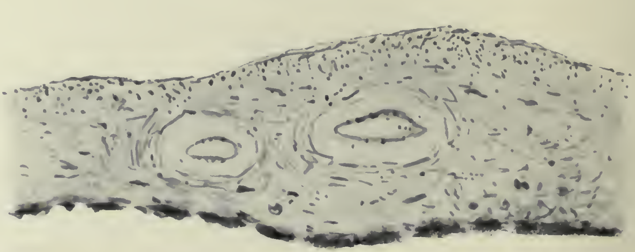

Fig. 2.

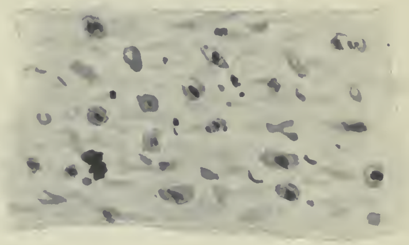

Fig. 3.

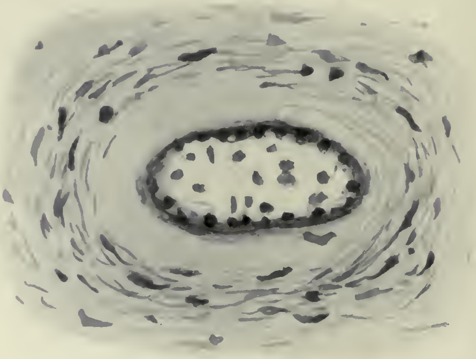

Fig. 4.

Bistis, Heterochromie.

CLINICAL AND EXPERIMENTAL INVESTIGATIONS ON THE ETIOLOGY OF HETEROCHROMIA.

BY DR. J. BISTIS, ATHENS, GREECE.

Translated from the *Arch. f. Augenhlk.*, Vol. LXXV., 1913.

(*With four illustrations on Appended Plate No. XXII.*)

HETEROCHROMIA is either congenital or acquired. In the former case in one eye the development of the pigment in the stroma ceases in the first years of life. In the latter case the iris becomes decolorized without visible cause after the pigmentation in the stroma has become fully developed. That this is a pathologic process is shown by the frequency with which cataract develops in the eyes with this pigment anomaly in the iris and by the observation that the heterochromic eye presents posterior corneal deposits.

Disturbances in the formation of the uveal pigment are regarded as causes for this heterochromia. It was formerly believed that the pigment in the iris stroma did not develop normally on account of trophic disturbances. Recently Lutz, Mayou, Galezowski, have observed in the lighter-colored eye symptoms of sympathetic paralysis, such as ptosis, miosis, and half-sided facial atrophy on the same side. In examining the report of eyes with heterochromia, I have found symptoms suggestive of involvement of the sympathetic, without any attention being paid to this by the authors. In this paper, which was published in the *Archives d'ophtalmologie*, a case of heterochromia was published with paralytic phenomena on the part of the cervical sympathetic. The patient, a woman 38 years of age, presented heterochromia in the right eye. This developed two years ago without known cause. The right iris was grayish-blue, that of the left eye was brown. The markings of the pale iris were blurred. On the instillation of cocaine the right heterochromic pupil remained distinctly narrower than the left. Numerous deposits on the posterior surface of the cornea could be seen with the loupe. There were in addition slight ptosis, enophthalmus, and distinct hemiatrophy of the face on the right side. According to the statement of the patient, the facial atrophy came on at the same time that the iris changed its color.

I wish to report on the following case:

> T., 36 years old, has always enjoyed good health. The family history is negative. The hair is brown, though it is beginning to turn gray. The skin is delicate and white. The right eye is normal. The iris is brown. The pupil measures 3½*mm* with ordinary illumination. Intraocular pressure normal; eye ground and vision are normal. The left eye presents a slight ptosis. The palpebral fissure measures 9*mm*, while that on the right side is 12*mm*. There is slight enophthalmus. There are two deposits on the posterior surface of the cornea. The anterior chamber is normally deep and the aqueous is not clouded. The iris has a gray color. The markings of the iris are blurred and the stroma atrophic. The pupil is narrower than the right and measures 2½*mm*. After cocaine the left pupil remains the same size. $\frac{1}{1000}$ adrenalin has no effect. Ophthalmoscopically the optic nerve is found to be atrophic. Vision is reduced to counting fingers. Intraocular pressure normal. Left half of the face not atrophic. This heterochromia may possibly belong to the congenital group.

In the above-mentioned article I suggested that heterochromia could be a consequence of paralysis of the sympathetic nerve. This case, in which Horner's syndrome is present, may be regarded in favor of this view.

I have made the following experiments on rabbits to confirm experimentally the relationship between the paralysis of the cervical sympathetic and heterochromia:

Experiment 1. Rabbit weight 835g. Both irides brown. November 20, 1911, the right superior cervical ganglion is, extirpated. This was followed by miosis and narrowing of the palpebral opening. Slight enophthalmus. The intraocular pressure remained the same. January 25, 1912, the color of the right iris was distinctly paler than the left. Cocaine instilled in the right eye caused no dilatation of the pupil. Adrenalin produced a mydriasis in the right and none in the left eye.

Experiment 2. Rabbit weight 1320g. Iris brownish-yellow. November 25, 1911, the right superior cervical sympathetic ganglion was extirpated. Same symptoms followed as were observed in the preceding experiment. No change in the intraocular pressure. January 25, 1912, the color of the right iris had not changed. The animal died after a number of days.

Experiment 3. Rabbit weight 1400g. Irides brown. The right superior cervical ganglion was extirpated November 26, 1911, with the usual paralytic symptoms. The intraocular pressure did not change. On January 25, 1912, the iris was of the same color. May 7, 1912, there was a slight discoloration of the right iris. Unfortunately the animal died from an intravenous injection of adrenalin.

Experiment 4. Rabbit weight 1670g. Iris brown. The left upper cervical ganglion extirpated November 1, 1911. The usual symptoms followed and pressure remained the same. The color of the iris on January 22, 1912, was the same. March 10, 1912, it had become distinctly paler. The animal died after a length of time. In these last three cases the action of cocaine and adrenalin on the paralyzed pupil was the same as in the first experiment.

The first animal on December 11, 1912, showed the following changes in the right eye: narrow palpebral fissure, miosis, cornea clear, no deposits, aqueous slightly clouded, iris distinctly paler, with blurred markings. April 10, 1913, sixteen months after the extirpation of the ganglion, these changes had become more pronounced. The aqueous is distinctly cloudy and the iris is discolored throughout. The delicate markings are washed out and the iris tissue seems swollen.

In this experiment a slight discoloration of the iris took place two months after the extirpation of the superior ganglion, and sixteen months later the iris was distinctly discolored and the markings in the iris were blurred.

Fuchs was the first to examine a case of heterochromic iris histologically. This occurred in cases where the cataract had been extirpated. He found some pigmentation in the anterior limiting layer of the iris. The deeper layers, however, showed only isolated remnants of branching stroma pigment cells which had become round and the delicate interlacing appearance of the stroma cells was lost. The blood-vessels showed changes consisting in a thickening of the walls. According to Fuchs, in the paler iris there is an atrophy of the normal cell membrane with the presence of numerous nuclei and the formation of fibrillary connective-tissue in the stroma.

The eyes of the rabbit above reported on were enucleated and the sections stained with hematoxylin and eosin.

In the diagram, Fig. 1 shows the normal eye; Fig. 2 is that of the pathologic eye. In the first there is rich pigmentation of the anterior limiting membrane and of all the layers of the iris stroma. In the affected eye the amount of pigment is greatly reduced and the walls of the vessels are very much thickened. On examining the sections under the high power, we find in the pathologic specimen that the pigment in the anterior layers is very much reduced and appears in the shape of small aggregations and pigment granulations. The iris stroma possesses no pigment cells. There are a few pigment granulations which are scattered in the basement membrane (Fig. 3) and sometimes develop into streaks (Fig. 4). There are some irregularly rounded pigment cells which are probably altered pigment cells of the stroma. The retinal pigment layer is normal.

The iris stroma contains a large number of nuclei which occupy the places of the stroma cells (Fig. 3). The nuclei are round or oval, some are elongated, situated in a basement substance composed of fibrillary connective-tissue. There is no lymphocytic infiltration.

The ciliary body shows less pigment than in the healthy eye. The vascular wall of the blood-vessels is thicker, homogeneous, and contains a few nuclei (Fig. 4). The changes are characteristic of a hyaline transformation of the vessels' walls. The endothelium is normal. There are streaks of pigment around the blood-vessels.

The histological change, in brief, consists in a distinct diminution of the pigmentation in the iris stroma and the new formation of fibrillary connective-tissue in the stroma. The changes in the walls of the vessels are noteworthy and suggest an inflammatory condition which in turn produced the changes in the iris stroma and the pigment atrophy. The cloudiness of the iris tissue and the posterior corneal deposits also suggest the inflammatory nature of this process. It seems to me that these clinical and experimental observations justify the conclusion that heterochromia is caused by a paralysis of the cervical sympathetic.

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DEPARTMENT ON CONSERVATION OF VISION.

EDITED BY DR. GEORGE S. DERBY AND HENRY COPLEY GREENE, ESQ., BOSTON.

AN important development in work for the prevention of blindness and the conservation of eyesight is the recent formation of the National Committee for the Prevention of Blindness, with headquarters at 130 East 22d St., New York. The Board of Directors, as first announced, consists of sixteen members of the New York State Committee for the Prevention of Blindness, plus John M. Glenn, Preston S. Miller, Ira A. Place, J. A. Shawan, and Edward M. Van Cleve. The Managing Director is Edward M. Van Cleve, formerly Chairman of the Ohio Commission for the Blind, but now principal of the New York Institution for the Education of the Blind in New York. The Secretary is Miss Carolyn C. Van Blarcom, who is also Secretary of the New York State Committee on the Prevention of Blindness. The Field Secretary is Gordon L. Berry.

The Board of Directors is limited to thirty members. With twenty or twenty-one New York Directors already on the Board, it therefore appears probable that representatives from other States will form only a small minority of the whole Board. It is to be hoped, however, that adequate representation of States other than New York may in some way be secured, and especially that some form of partnership, if not an actual merger, may be arranged between this National Committee and the Committee on Conservation of Vision of the American Medical Association.

The new National Committee has promptly begun work by issuing an illustrated popular booklet on children's eye diseases and the following leaflets: "State Laws and Rulings Relating to the Prevention of Blindness from Babies' Sore Eyes," "Take Care of Your Eyes," "Directions for the Prevention of Blindness from Babies' Sore Eyes," and "Photographic Exhibits on Babies' Sore Eyes, Wood Alcohol, Midwives."

The new National Committee has also begun the publication of a "News Letter." From "News Letter No. 1" we have condensed, and classified by States, the following account of recent work for the conservation of eyesight and the prevention of blindness.

Illinois.

The Illinois Health Department has provided for the free distribution of silver nitrate. In sending out the notice the Secretary of the State Board of Health says: "Attendants at births may secure these packages without cost, provided that they report all births attended by them as required by law."

The Illinois Association for the Prevention of Blindness organized a meeting of prominent citizens in March to consider and provide for effective and permanent work.

Indiana.

A law enacted by the General Assembly of Indiana this winter creates a Commission for the Blind, which is to provide industrial aid for adults, and to work for the prevention of needless blindness in co-operation with the State Board of Health.

Kentucky.

A law recently enacted in Kentucky requires the State Board of Health, acting with the county boards of health and county societies, to conduct schools in each county, upon which attendance is made compulsory, for the instruction of physicians and midwives in the most approved methods to be used by them in the prevention of blindness, emphasizing attention especially to ophthalmia neonatorum and trachoma and requiring a prompt report of these diseases.

Maryland.

The Federation of Women's Clubs of Maryland gave considerable attention, at their annual meeting this spring, to the subject of prevention of blindness.

Massachusetts.

The Massachusetts State Commission for the Blind will continue its special investigation and other work for persons whose eyesight is seriously defective or who are liable to become visually handicapped or blind; this work to include advice and co-operation as to suitable education for children of school age, vocational guidance and industrial aid in individual cases of adults and minors above school age, and study of similar work done in other States and countries. For this work a special appropriation of $1500 has been made.

Michigan.

A report from Michigan states that 19 cases of blindness were prevented in that State, during the year 1914, through the activities of the Association for the Blind.

Missouri.

The Missouri Association for the Blind has succeeded in getting the Board of Health to make ophthalmia neonatorum and trachoma reportable diseases. The Association, in following up individual cases during the past year, has cared for 167 cases of eye trouble. The secretary has given talks, illustrated by slides, before various clubs, State conferences, etc., and also enlisted the services of physicians, who have given similar talks before other audiences.

Kansas City has passed an ordinance making it obligatory upon attendants at births to apply a solution of nitrate of silver to the eyes of every newborn child. A fine of not less than $25.00 nor more than $500.00 is the penalty provided for a violation of the ordinance. Reports from Kansas City indicate that physicians there are co-operating with the Health Department in the reporting of babies' sore eyes and in the use of a prophylactic.

New Jersey.

The New Jersey Association for the Prevention of Blindness, at a meeting held May 4th, planned a vigorous campaign of education through lectures and publicity on the conservation of vision.

New Hampshire.

A law enacted by the New Hampshire Legislature in March provides for the reporting of "babies' sore eyes" and for the after-care of reported cases.

New York.

The New York State Department of Health has recently amended its Sanitary Code to include provisions for the control of midwives as follows:

1. The licensing of all women who call themselves midwives, in order that they may be brought under the supervision of midwife inspectors.
2. After January 1, 1915, the issuing of licenses to those women only who shall have attended 15 maternity cases and nursed 15 lying-in patients, under the supervision of a physician—this, pending the enactment of laws empowering the Board of Regents to examine and license midwives, and regulate midwife training schools.
3. The adoption of rules and regulations which will limit the work of midwives to attendance upon normal cases only, and nursing of mother and child, these rules and regulations to be enforced by a practical system of supervision which will tend to improve the work of the midwives.

The Division of Laboratories of the New York City Department of Health is studying 1000 cases of babies' sore eyes, and also following up 1000 consecutive births, for the purpose of obtaining information on the following points:

1. The number of cases of babies' sore eyes occurring in 1000 births.
2. The percentage of cases of sore eyes in which a prophylactic had been used; kind of prophylactic.
3. Percentage of cases of sore eyes in patients delivered by physicians; by midwives; in hospitals.
4. Day of life on which symptoms first appeared.
5. Whether symptoms were due to silver irritation or an infection; kind of organism present.
6. Nature and duration of treatment.
7. Comparative results of home and hospital treatment.
8. Comparative results among breast- and bottle-fed babies.

9. Frequency and seriousness of permanent damage.

In New York City last summer a number of persons died and two became blind through the use of a cordial containing wood alcohol. The man who was responsible for this was indicted for manslaughter. Before Judge Page of the Supreme Court of New York, he pleaded guilty and was deported to his native country, Greece.

To help prevent blindness and death from wood-alcohol poisoning, the New York City Department of Health has amended its Sanitary Code as follows:

> "Section 66A. No person shall sell, offer for sale, deal in or supply, or have in his possession with intent to sell, offer for sale, give away, deal in or supply any article of food or drink or any medicinal or toilet preparation, intended for human use internally or externally, which contains any wood naphtha, otherwise known as wood alcohol, or methyl alcohol, either crude or refined, under or by whatever name or trade-mark the same may be called or known.
>
> "No person shall sell, offer for sale, give away, deal in or supply, or have in his possession with intent to sell, offer for sale, give away, deal in or supply any wood naphtha, otherwise known as wood alcohol or methyl alcohol, either crude or refined, under or by whatever name or trade-mark the same may be called or known, unless the container in which the same is sold, offered for sale, given away, dealt in or supplied, shall bear a notice containing the following device and words conspicuously printed or stenciled thereon, viz.:
>
> Skull and crossbones POISON Skull and crossbones
>
> WOOD NAPHTHA
>
> OR WOOD ALCOHOL
>
> "WARNING.—It is unlawful to use this fluid in any article of food, beverage, or medicinal or toilet preparation for human use internally or externally."

In the United States District Court in Buffalo, a government suit has been brought against a Rochester firm for fraudulent use of the mails. The firm offers a so-called "system" for the improvement of the vision, consisting of the instillation of a solution of boric acid and bicarbonate of soda accompanied by massage and general health measures.

At the meeting of the New York State Medical Society, held at Buffalo in April, two addresses on the Prevention of Blindness and Conservation of Vision drew the largest audiences of the session.

North Carolina.

In North Carolina plans have been made for a campaign of education, the initial steps of which will be taken at the time of the meeting of the State Medical Society in June. Meantime Supt. John E. Ray's statement, "Can Blindness be Prevented?" has been widely published, and many a newspaper is using it as an editorial.

Ohio.

In Ohio the Commission for the Blind is strongly supported by an advisory Committee of Ophthalmologists. Under their direction representative men of the profession have spoken on the subject of prevention of blindness to over 20,000 people throughout Ohio during the past twelve months.

The Commission has published, as a reprint from the *Ohio State Medical Journal*, Dr. Mark D. Stevenson's paper "Concerning the Use of a Prophylactic for the Prevention of Babies' Sore Eyes." Dr. Stevenson's contention is stated as follows: "It is difficult to be sure that the gonococcus is present and its importance has usually been overestimated and not undercalculated." The Commission continues its newspaper service for the small newspapers outside the large cities, a kind of work which it has been doing for several years and with constantly increasing effect. This service is carried on through the press associations and is eagerly sought by the newspapers of the State.

A serious trachoma situation which developed some time ago in the Youngstown Sheet and Tube Company's plant, was promptly handled with excellent results. A recurrence of the trouble, reported recently, is being met with vigor.

In North Lewisburg, Ohio, trachoma has been found in a number of school children. The Ohio Commission for the

Blind, in co-operation with the State Board of Health, has corrected this condition through several months of treatment.

The City of Toledo has opened a school for myopic children. This makes the third school of that character established in this country, the first being in Boston, the second in Cleveland. Books specially printed in heavy-face large type are used for reading, but the principal work of the school is oral.

Tennessee.

A law enacted by the Tennessee Legislature April 1, 1915, and approved by the Governor April 3d, requires physicians, nurses, or midwives to use a prophylactic named and approved by the State Board of Health. Failure to comply with the provisions of the law is punishable by fine and imprisonment.

Texas.

At a Sociological Congress held in Houston, Texas, May 8–11, the general theme was the conservation of health. Prominent place was given to an address on the "Causes and Prevention of Blindness among Children," to be delivered by Supt. O. W. Stewart of the Oklahoma School for the Blind, Muskogee, Oklahoma.

Wisconsin.

The Wisconsin Association for the Blind, Miss Carrie B. Levy, Secretary, Milwaukee, is about to send throughout that State a lecture on the Conservation of Vision.

REPORT OF THE TRANSACTIONS OF THE SECTION ON OPHTHALMOLOGY OF THE NEW YORK ACADEMY OF MEDICINE.

BY GEORGE H. BELL, M.D., SECRETARY.

H. H. TYSON, M. D., CHAIRMAN. MONDAY EVENING, JANUARY 18, 1915.

Dr. LINN EMERSON presented a patient with **epithelioma of the lid.** Mr. O., age 50, presented himself with what appeared to be two small chalazia on the left lower lid at the junction of the middle and inner third. There was some induration, and they were connected by a slight ridge of elevated and indurated conjunctiva. Several colleagues expressed doubt of malignancy, and the growths were dissected out from the conjunctival surface of the lid with scissors. Microscopic examination was unsatisfactory on account of the small size of the specimen, but did not seem to indicate malignancy. Healing was rapid, but at the end of four or five weeks a small hard growth appeared in the deeper tissues of the lid. On November 4th, a V-shaped piece of the entire thickness of the lid and conjunctiva was removed, embracing about one-third of the lid margin. External canthoplasty and loosening from the maxilla permitted sliding of the flap and easy approximation. The punctum was spared, so there is no epiphora, and, as can be seen, the cosmetic effect is excellent.

Microscopic examination showed epithelioma, and the section indicates that the excision extended well beyond the diseased area into healthy tissue.

In discussing the case, Dr. W. R. BROUGHTON said the only point is to know how much to take out. He then referred to a case of his own where he operated and took out all the diseased tissue, as he thought. In three or four weeks, the disease broke out again.

Dr. J. H. CLAIBORNE thought it was a beautiful operation. In his opinion, X-ray and radium treatment should be considered before operating upon such cases.

Dr. E. S. SHERMAN said that he had had no experience in regard to the value of radium and of X-ray, but that he had used carbonic snow. In a recent case of epithelioma of the outer canthus he had advised operation, but wondered afterward whether he should not have advised X-ray or radium.

Dr. J. R. SHANNON reported two cases, one of which occurred in a man seventy years of age, treated with the X-ray. There was no trace of the disease after two years. The other patient was a woman, age forty-five, treated with radium by Dr. Abbe, with no signs of recurrence for eight months.

Dr. H. H. TYSON said that very good results were obtained by treating superficial epithelioma with carbonic snow, and suggested that cases where the patients refused surgical interference might be benefited by the application of carbonic snow, which if properly applied is followed by very little reaction.

Dr. EMERSON, closing the discussion, said that some of these cases do well under these various remedies for a while, but that if taken in time and thoroughly excised one can be sure of complete cure.

Dr. JOHN R. SHANNON presented a young woman aged 18 with **interstitial keratitis.** She was first seen in September, 1914. The Wassermann test was strongly positive, and the patient was given an injection of salvarsan 0.5*g*, and was subsequently put on mercurial inunctions, with atropin and hot applications. The inflammation was severe from the first, and the patient was much enfeebled. Five weeks later a muco-purulent discharge from the conjunctiva appeared, which was examined in culture and smear and found to contain only staphylococci. The cornea became yellowish in appearance, and the epithelium was eroded in the center. The corneal substance rapidly necrosed, until the ocular contents were held in place only by Descemet's membrane, surrounded by a moderately wide ring of opaque cornea. The left lens became dislocated into the anterior chamber, but, although sticking forward like a mushroom, was prevented by careful handling from breaking through, and was now almost entirely absorbed. The right cornea became opaque in the center, but cleared from the periphery and she was now counting fingers at one foot. The possibility of this being an instance of the Herxheimer reaction had been suggested, but the relator was inclined to the opinion that the conjunctival infection, together with the patient's feeble resistance, was more likely to be the cause.

Dr. G. H. BELL inquired whether or not the von Pirquet test was made in this case; also whether or not he had tried tuberculin in connection with antisyphilitic treatment.

Dr. SHANNON replied in the negative.

Dr. C. H. MAY, in connection with Dr. Shannon's case, reported a case of **interstitial keratitis** in which salvarsan was used and produced a herpes of the cornea.

Dr. W. G. REYNOLDS showed a case of **tumor of the orbit** in a man aged 24. He is sure the eye has not been straight for years, but picture taken when young shows eye normal. X-ray negative; also Wassermann. The tumor is located in the region of the gland and can easily be felt as a firm mass, apparently extending well back; the eye is pushed down and out. Dr. Reynolds hopes later to report on the growth.

Dr. L. W. CRIGLER said that several years ago he had had a similar case, and on cutting down on the tumor he found a piece of wood. Exophthalmos and tumor disappeared.

Dr. H. H. TYSON reported a case of **amaurotic family idiocy.** Although both of Jewish descent, the parents were not related previous to marriage. The child was a baby girl, twenty months of age, well nourished, fairly strong, and still able to control the movements of the head. Eye backgrounds showed typical picture of the condition, with pale optic nerves and a large round white zone surrounding a liver-colored spot in the macular region, the white zone being equal to about three disk diameters in size. He was interested in knowing the earliest date at which the ocular changes could be noted. He had seen at least fifteen cases—the youngest being three months old—in which the white zone in the macular region was faint and only about the size of the optic disk. He thought it possible that in these cases the ocular signs could be found at birth, and would then precede the other symptoms for which the mother usually sought advice, instead of being found after they appeared, as is now the case.

Dr. J. H. CLAIBORNE described an operation for **advancement of a rectus muscle.** The main point of the operation consisted in cutting off the piece of conjunctiva and capsule from the internal lip of the wound so that when the muscle was advanced and the conjunctiva was drawn along with it there was no buckling of the flap but rather a neat apposition of the lips of the wound.

Dr. W. R. BROUGHTON said that he did the same operation as Dr. Claiborne, and liked it very much.

Dr. LINN EMERSON spoke of a case of **divergent strabismus** following tenotomy of internal rectus, where there was about 25° of divergence. A double tenotomy was done, and the eyes have remained straight for four years.

Dr. CHARLES HERMANN read a paper on **Blue sclerotics as a family peculiarity, associated with brittle bones, with report of case.** The blue sclerotics described represent a distinct affection, to be differentiated from those seen in congenital heart disease, hydrophthalmos, or in young infants. The sclerotics are of a china blue, occasionally with a grayish tinge. The most complete series is that reported by Stephenson and Harman; in five generations of one family, consisting of 55 individuals, 31 showed this peculiarity. The condition is transmitted only through affected members, never skips a generation. The blue color is probably due to a deficiency in fibrous tissue, making the sclerotics unusually transparent.

The patient reported was a boy of two and a half years, who had blue sclerotics and fragility of the bones. He had sustained fractures of the right femur and tibia from very slight traumatism. Radiographic examination of the leg showed that the bone lacked density and had very little cortical portion. The soft parts also showed diminished density. This lack of density, which is probably due to a deficiency of lime salts and of fibrous tissue, would account for the frequency of sprains and fractures.

Dr. H. H. TYSON said that inasmuch as the majority of the cases reported had had a moderately high degree of astigmatism, he thought that fact would appear to account for the appearance of the oval optic disks. He inquired as to whether an embryo-toxon was present in Dr. Hermann's case as it was in those reported in literature. He emphasized the fact of the cornea being ¾ and the sclera ⅓ of the normal thickness, and histologically showed that the fibers were about of normal size, but fewer in number, Bowman's membrane being entirely absent. As these facts were obtained from an enucleated eye with blue sclerotic, they should be given due consideration. He had seen two cases of congenital heart disease (patent foramen ovale) with cyanosis retinæ, in which the sclera had a bluish tinge.

He mentioned the fact that the difference in the sexes in the inheritance was interesting. Of the cases reported, considering the affected kinships only, there were 27 males and 22 females born; and of the affected, 12 were males and 18 were females. The inheritance was always through the females, but in this consideration allowance must be made for the fact that only one affected male had married and had issue, and these children were reported to be unaffected.

MEETING OF FEBRUARY 15, 1915.

Dr. CLAIBORNE showed a case of **removal of the tarsal cartilage in old trachoma** by his method with a specially made clamp. The patient had been unable to do his work and could see fingers only at one to two feet. The cornea was clouded; pannus. There were pain, lacrimation, and entropion. In eighteen months, vision rose to fingers at sixteen to eighteen feet; cornea, much clearer; no pain; no lacrimation; entropion relieved. In a few weeks after operation the symptoms were so much improved that the patient could work with comfort. The other eye, also affected by old trachoma, was much improved by astringent treatment with boric acid, camphor, and adrenalin.

Dr. Claiborne pointed out the humanity and merits of the operation, but also said that the life of the operation would be limited, as old cases of trachoma are becoming rarer by reason of our immigration laws.

Dr. LINN EMERSON showed a patient with **blepharochalasis.**

Dr. WEEKS differed with Dr. Emerson about the diagnosis and said that blepharochalasis is an atrophy of the skin and generally occurs at puberty. In Dr. Emerson's case the skin was thick. He thought it was a case of atrophy dating from early life.

Dr. CLAIBORNE agreed with Dr. Weeks about the diagnosis in Dr. Emerson's case.

Dr. EMERSON, in reply, said he still thought it a case of blepharochalasis; the skin was not thick. Dr. Thomson and Dr. van Fleet had both seen the case and both agreed with him about the diagnosis.

Dr. JOHN E. WEEKS showed a case of **xerosis triangularis,** in a girl about sixteen years of age. There was a foamy or tallow-like patch of exudation on the cornea of the left eye. The condition was due to a specific bacillus which was first mentioned by Colmiatti and was afterwards carefully studied by Leber. Dr. Weeks thought the patient's vitality was reduced by malnutrition. Her diet had been improved and she was using astringents.

Dr. CLAIBORNE suggested cutting off the exudate or curetting it.

Dr. GOODFRIEND said that the method suggested by Dr. Claiborne had been followed in a case at the Manhattan Eye, Ear, and Throat Hospital, but that the case did not do well. Dr. May had used carbonate of soda on a case with very good result.

Dr. J. H. CLAIBORNE showed a pocket **electric ophthalmoscope,** which consisted of the Hare system of lenses and reflectors attached to the ordinary pocket flashlight torch, medium size. By sliding upon the stem the hood containing the lenses (the focus being adjusted thereby), the instrument could be used for direct and indirect examination. The flashlight box was colored black to match the ophthalmoscope, the whole being contained in a small box like a spectacle case, easily carried in the pocket. The instrument, however, could be carried in the pocket with still more comfort without the case, the upper waistcoat pocket being the best. The whole instrument was light, comfortable to the hand, and portable, and the electric light was certain. The ordinary commercial battery could be obtained in any electric shop and required no special making. No originality was claimed for the component parts, the idea of the pocket flashlight having been suggested and used by Harrower, the lenses and reflectors by Hare. The instrument, however, was much simpler in this combination than any other, lighter, more commodious, and the electric light was more reliable. It was made by Meyrowitz.

Dr. WILLARD G. REYNOLDS reported a case of **infection fourteen months after an Elliot trephine operation.** In November, 1913, an Elliot trephining operation was done with iridectomy. The patient was a fat woman, fifty-nine years of age, in good general health. She had been coming to the clinic with a chronic glaucoma. The healing was uneventful, and she left the hospital after ten days, with the eye quiet. She reported occasionally at the hospital, and the result was apparently good. Tension was practically normal.

About two weeks ago she reported at the hospital, giving a history that for a number of days the eye had been causing pain. The eye was red, and there was some pus in the anterior chamber, the pupil was small, and there were many adhesions. The irritation about the trephine scar was so marked that there could be no question but that the infection had begun at that point.

The patient was put to bed and treated with strong atropin, heat, etc.

At the time of presentation the eye was quiet, the tension normal, and the pupil dilated, yet the covering over the trephine opening was very thin and looked roughened.

Dr. JOHN E. VIRDEN read a short paper entitled, **Are cocaine solutions injured by boiling?**

In his experiments he used five different solutions of cocaine. In solutions 1 and 2, the repeated boilings greatly concentrated the solutions, so that they were more than 4 per cent. In solutions 3, 4, and 5, he added sterile water after each boiling so as to retain practically a 4 per cent. solution for use. All the solutions were boiled for at least three minutes, at different times, and solution No. 5 was boiled for periods of 15, 12, and 15 minutes,—making a total boiling of 42 minutes. With all solutions boiled, he was able to secure the desired anæsthesia with a small amount. He had no irritations of the cornea or conjunctiva, and the healing of surgical wounds had not been interfered with in any way.

He is convinced that frequent or even prolonged boiling of solutions of cocaine muriate does not injure or destroy their anæsthetic value, nor does it make them more dangerous to the tissues to which they must be applied in ophthalmic surgery,—which he has proven by removing foreign bodies from the cornea, also by doing iridectomies and mature senile cataracts.

MAX POSER, F.R.M.S., of the Bausch & Lomb Optical Company, delivered an illustrated lecture dealing with the evolution of ophthalmic lenses and the new system of designating their power.

The address incorporated the latest discoveries of science in the field of ophthalmic optics, the lecturer dealing first with the historical part of ophthalmic lenses and leading over to the latest lens systems which are known as punktal and katral lenses. It was interesting to follow the various improvements at different periods. A number of lantern slides were projected on the screen to illustrate what had been accomplished. Photographs of test type, taken through the various forms of ophthalmic lenses, were shown on the screen. These photographs were so taken that they represented the object as it appears to the eye when looking through the ophthalmic lens at the center and then, slowly rotating, moving toward the margin of the lens. It was thus clearly demonstrated that while an eye will perceive clear vision with an ordinary ophthalmic lens over an angle of field of about 16°, the punktal lenses and katral lenses will give a clear vision over an angle of 60° field of view. This remarkable discovery was made at the optical works of Carl Zeiss, Jena, and the lenses are made by the Bausch & Lomb Optical Company, Rochester, N. Y.

Many experiments had to be made before the work could be completed. The lecturer explained that these new forms of lenses are mathematically calculated in strict relation to the center of rotation of the eye, owing to which the present system of base curves cannot be made use of. It is therefore necessary to construct curves for every dioptric number of these lenses, and naturally such a process is rather costly and the lenses themselves are more expensive than those of the base curve system. These new forms of lenses are numbered in a somewhat different system from the present dioptric system, since their focal lengths are measured from the pole of the surface facing the eye to the focal point, instead of from the principal point to the focal point, as is the case in the old form of ophthalmic lenses.

Mr. Poser explained why it is that with our present method we obtain different correcting power when a patient has been refracted with the ordinary trial lens and is then to wear a meniscus of the same dioptric number. This is brought about owing to the principal points from which the focal power of a lens is measured, which principal points are within the lens in the trial-case forms and more or less outside of the lens with the meniscus forms. These difficulties, however, will be easily overcome when making use of the new system explained by Mr. Poser, termed "vertex refraction," since an ametropic eye is corrected not by the dioptric power of a lens but by the back focus. This "vertex refraction" system is very important in correct eyesight refraction, and the lecturer took great pains in demonstrating all these facts by a number of illustrations relating to geometrical optics.

If one considers that a person being operated upon for cataract with the crystalline lens removed and then fitted with these katral glasses in the manner described by the lecturer, when a clear angle of 60° is obtained so that the eye can rotate freely in the socket like a normal eye, one can highly appreciate what science has accomplished for the benefit of humanity.

Mr. Poser also described a number of precision instruments which enable the practitioner to carry out most precise fitting of lenses in order to realize the full quality of these highly corrected ophthalmic lenses.

REPORT OF TRANSACTIONS OF THE SECTION ON OPHTHALMOLOGY OF THE ROYAL SOCIETY OF MEDICINE.

By C. DEVEREUX MARSHALL, F.R.C.S., London.

The ordinary meeting of the Section was held on Wednesday, March 3d, Mr. J. B. Lawford, Vice-President, occupying the Chair.

The following clinical cases were shown:

Mr. A. C. Hudson, two cases of **couching of the lens.**

Mr. Stephen Mayou, **glaucoma** in a boy æt. 17 years.

Mr. G. W. Roll, (1) **bullet wound of orbit;** (2) **proptosis.**

Mr. Rayner Batten, **vascular keratitis** of upper third of cornea, with terminal perivascular deposits.

Mr. Charles Wray, **conical cornea.**

Mr. Leslie Paton read a paper entitled, **The Montessori system and its use for children with defective vision.** He said his attention was called to the value of the system of education in the case of children with defective sight by having a patient æt. 2½ years in whom severe ophthalmia neonatorum had caused blindness in the left eye and very defective vision in its fellow. He was greatly impressed a year later by the boy's general intelligence, and by the fact that he knew his letters and could count small numbers. The parents ascribed this improvement to six months' training which he had received at a Montessori school. The method was most applicable to children between three and six years of age, the most important period of sensory education. There were several of these schools in the country, but the difficulty was to find the right conductor. It was difficult to resist the temptation to interfere with the child, but the reward came in the child's intense satisfaction when he had succeeded unaided. If the child were really interested in his task, no outside influence would prevent his continuance at it. Even in normal children, most of the exercises were done blindfolded, so as to exercise the tactile, muscular, and stereognostic senses. By this system vision played but a small part in learning to write; the art was acquired almost as a bye-product during the training of the tactile muscular sense. He described, aided by the actual models, the kind of training given, which included the discrimination of various sounds, and rhythm. The method enabled children to perform, by the assistance of these senses, many complex acts accurately. A difficulty with English children, however, was the fact that English was perhaps the least phonetic of European languages, while the Italian was almost purely phonetic. It left the child to develop its inherent capacities, in opposition to the usual method of inculcating from outside truths in the form of dogma. The children seemed to be unconscious that they were doing more than playing at a most absorbing game, yet they were undergoing self-discipline, and a social recognition of duties to others.

Mr. N. Bishop Harman read a paper on the cognate subject **The education of children with defective vision.** The claims of the Montessori system were compared with the scheme of "myope classes" which had been working in this country and America seven years. In Italy the Montessori system had one great advantage over the current modes of education in that it allowed for the personality of the child, and it had proved of great value for mental defectives. But the spirit of England was against anything in the nature of drill-sergeant education, personality having always been fully recognized; moreover in its technical methods the Montessori system had nothing new to offer, and it had been claimed that a substitution of feeling for sight was a reversion to a lower order of things. If the claim was substantiated that by the Montessori system a child learned to read two years earlier than by the ordinary methods, it effectively condemned the system for children with defective vision; it placed the child too early into the unreal world of books, and there was an absence of childish questioning for information. The myope class had a natural origin, numbers of shortsighted children had to be dealt with. The scheme resolved itself into three parts: (1) oral teaching with normal children; (2) literary work in the special class where all the work was done on blackboards; (3) handicraft work, which had both utilitarian and "expressional" value; and to this work were attached the practice of history, arithmetic, geography, etc. Despite the regulation forbidding work necessitating stooping and the use of rules and scales, the handicraft work had been highly developed. It was working as a full scheme in elementary schools for children aged from seven to fourteen years; and was also used, with modifications, in the teaching of children in well-known public schools with equal success.

The papers were discussed by Mr. Charles Wray and Dr. G. E. Shuttleworth, and the authors replied.

QUARTERLY REVIEW OF THE PROGRESS OF OPHTHALMOLOGY.

By H. Koellner, Berlin; W. Krauss, Marburg; R. Kümmell, Erlangen; W. Loehlein, Greifswald; H. Meyer, Brandenburg; W. Nicolai, Berlin; H. Pagenstecher, Strassburg; K. Wessely, Würzburg; and M. Wolfrum, Leipsic, with the Assistance of Drs. Alling, New Haven; Calderaro, Rome; Causé, Mayence; Danis, Brussels; Gilbert, Munich; Groenholm, Helsingfors; v. Poppen, Petrograd; Treutler, Dresden; and Visser, Amsterdam.

Edited by Matthias Lanckton Foster, M.D., F.A.C.S.,
New Rochelle, N. Y.

THIRD AND FOURTH QUARTERS, 1914.

I.—GENERAL OPHTHALMIC LITERATURE.

See Book Reviews.

II.—RELATIONS OF OPHTHALMIC TO GENERAL DISEASES, INCLUDING POISONS.

1. Adam. **Ocular changes in pregnancy and labor.** *Monatsschrift f. Gynaekol. u. Geburtshüle*, xxxix., p. 808.

2. Alexander, E. W. **An unusual case of ophthalmic migraine.** *Ophthalmology*, July, 1914.

3. Cavara, V. **Some rare localizations of the bacterium coli in the eye.** *Annali di Ottalm.*

4. Dutoit, A. **Eye troubles in a case of myxœdema.** *Zeitschrift f. Augenheilkunde*, August, 1914, p. 139.

5. Ewing, A. E. **Sodium chloride a possible cause of some obscure diseases of the choroid and retina.** *American Jour. of Ophthalmology*, July, 1914.

6. Green, John, Jr. **Enucleation in hæmophilia.** *Ibid.*, September, 1914.

7. Holden, W. A. **Ocular manifestations of the toxæmia of pregnancy.** *Journal of the A. M. A.*, July 4, 1914.

8. Jervey, J. W. **The influence of hookworm disease on the eyes.** *Ibid.*, July 11, 1914.

9. Luedde, W. H. **Ocular tuberculosis in relation to the nose and throat.** *American Journal of Ophthalmology*, October, 1914.

10. MANN. **A case of myasthenia with eye symptoms.** *Klin Monatsbl. f. Augenheilkunde*, July–August, 1914, p. 232.

11. PICCALUGA, L. **Initial syphilomata of the adnexa of the eye.** *Annali di Ottalm*, fasc. 12, 1913.

12. SCHWABE. **Relations between diseases of the eye and of the teeth.** *Deutsche Monatsschrift f. Zahnheilkunde*, xxxii., p. 401.

13. SPEYR, TH. **A case of acute quinine poisoning that left a permanent great contraction of the visual field.** *Klin. Monatsbl. f. Augenh.*, September.

14. STUELP, O. **Concerning the causal connection between chronic diseases of the eye and the so-called chronic rheumatism, especially the chronic progressive polyarthritis ankylosans and deformans.** *Zeitschrift f. Augenheilkunde*, xxxii., pp. 341 and 435.

15. THEOBALD, SAMUEL. **The ætiology of phlyctenular ophthalmia.** *Jour. of the A. M. A.*, August 15, 1914.

16. TYSON, H. H., and SCHOENBERG, M. J. **Experimental researches in methyl-alcohol inhalations.** *Ibid.*, September 12, 1914.

TYSON and SCHOENBERG (16, **Experimental researches in methyl-alcohol inhalations**) have shown that the refined methyl alcohol, called Columbian spirits, is quite as poisonous as the unrefined and more dangerous, because of the absence of disagreeable odor. They experimented upon dogs, rabbits, and a monkey and by carefully arranged apparatus proved that death can be brought about by inhalation alone. They believe that methyl alcohol is a true hæmatotoxic, producing degeneration of the tissues. In the eye it caused œdema which with increased viscosity of the blood interferes with circulation and leads to degeneration of the ganglion cells and nerve-fibers. The effects noted in the eye were: slight irritation, haziness of the cornea, hyperæmia, and œdema of the disks with dilatation of veins and arteries. The pupils were moderately contracted. Tension varied with the toxæmia: in mild cases, normal; in deep coma, marked hypotension. They enter a plea for proper protective legislation.

ALLING.

After the enucleation of an eye containing a foreign body GREEN (6, **Enucleation in hæmophilia**) contended with a hemorrhage which filled the orbital tissues and produced hernia between the lids. As bleeding continued he twice injected normal serum and the hemorrhage stopped within twelve hours.

ALLING.

Stuelp (14, **Rheumatic diseases of the eye**) considers it extremely doubtful if chronic recurring inflammations of the anterior segment of the eyeball are exclusively tuberculous. His conclusions are as follows: All chronic joint diseases are not rheumatic, consequently the complicating eye diseases are not necessarily rheumatic and are then not amenable to anti-rheumatic treatment. Tuberculosis is not the only common cause; on the contrary, accurate modern investigation has found various ætiological factors, usually several, and perhaps working in unison. In the clinical histories reported in the French and German literature neither the tuberculous nature of the joint affection is proved with certainty, nor are other causes properly excluded. To determine the various actuating causes an accurate general examination using all modern methods is necessary, for the negative statements of patients do not suffice to exclude certain causes. Treatment must be directed toward all of the causes discovered.

Piccaluga (11, **Initial syphilomata of the adnexa of the eye**) reports a case of fresh syphiloma of the conjunctiva of the lower lid in which spirochætæ were found. Wassermann's reaction was positive; the glands were swollen. Recovery. In a second case a syphiloma had existed for about a month on the margin of the lid. The principal symptoms had disappeared, but spirochætæ were still present.

Calderaro.

Luedde (9, **Ocular tuberculosis in relation to the nose and throat**) recites a number of cases in which the diagnosis of ocular tuberculosis was made by the fact that injections of tuberculin were followed by local reaction. Furthermore all but one showed reaction in the nasal sinuses. There were no signs of pulmonary or general tuberculosis.

Alling.

The relations between diseases of the eye and of the teeth are divided by Schwabe (12, **Relations between diseases of the eye and of the teeth**) into five groups:

1. Disturbances of development and hereditary diseases that affect the eye and the tooth at the same time, such as lamellar cataract and rachitic teeth, interstitial keratitis and Hutchinson's teeth.

2. Diseases of the teeth that spread to the region of the eye,

such as œdema of the lids with inflammations of the periosteum of the roots of the teeth, abscesses of the orbit in consequence of diseases of the teeth or jaws, and dental fistulæ that open so high as to simulate fistulæ from the lacrimal sac or from the orbit.

3. Dental diseases that induce reflex nervous disturbances of the eye, such as conjunctival hyperæmia, lacrimation, photophobia, blepharospasm, irritation of the optic nerve, and disturbances of the accommodation.

4. Diseases of the eye through direct or indirect infection from carious teeth or their neighborhood, blepharitis, conjunctivitis, and corneal ulcer.

5. Eye diseases due to disturbances of digestion and nutrition consequent upon septic processes in the teeth and mouth, such as scrofulous eye diseases, reduction of the power of accommodation, and increase of myopia through scleromalacia due to insufficient nutrition, and glaucoma caused by serious disturbances of digestion.

CAVARA (3, **Rare localizations of the bacterium coli in the eye**) reports a case of hypopyon keratitis caused by bacterium coli. The injury was characterized by a large ulcer of the cornea which was not very deep, had a dirty yellowish base without an advancing margin, associated with iritis and hypopyon. Treatment consisted of cauterization. In another case the bacterium coli was isolated from the pus of an abscess of the lower lid, caused by traumatism, and was found by experiment to be particularly virulent and to show pyogenic properties. The abscess grew slowly, had very thick walls, was filled with thick, yellowish pus, and caused a marked swelling of the preauricular and submaxillary glands.

CALDERARO.

JERVEY (8, **Influence of hookworm disease on the eyes**) reviews the literature of this disease as far as it pertains to the eye. He has studied 53 cases and found the most common condition pallor of the fundus and tortuous vessels. He also discovered retinal hemorrhages in two cases. He believes that the disease is not directly responsible for the eye lesions but indirectly because of the œdema and systemic disturbances, and therefore finds no eye lesion which is sufficiently characteristic to be of diagnostic value. ALLING.

Dutoit's (4, **Eye troubles in a case of myxœdema**) patient had bilateral posterior cortical cataract, chorioretinitis, and optic atrophy. Apparently the opacification of the lens and the chorioretinitis were closely related and chargeable to the myxœdematous disturbance of metabolism. The optic atrophy was not a pressure atrophy caused by a compensatory enlargement of the hypophysis to enable it to perform the duties of the thyroid. The roentgenograph showed no deviation of the sella turcica or of its contents from the normal. Hence optic atrophy may be one of the coördinated symptoms of thyrogenous autointoxication.

Mann (10, **Myasthenia with eye symptoms**) reports a case of myasthenia which is of special interest to ophthalmologists because the signs of weariness of the ocular muscles are prominent very often in the clinical picture. According to statistics these symptoms are present in eighty per cent. of the cases, and appear in the beginning in about forty per cent. The essential symptoms are ptosis and diplopia. The ptosis increases as the muscles grow more and more tired. The diplopia is not present at first, but appears after the eyes have looked back and forth a number of times, and is quite irregular, sometimes crossed, sometimes homonymous, sometimes vertical. The ocular muscles tire unevenly and the disturbance of movement does not correspond to an associated paresis. The pupils and accommodation are normal, as the myasthenic symptoms involve only the extrinsic muscles, not the smooth internal ones. The field of vision is normal, and there is no sensory weariness.

The case of a young woman who had suffered from typical migraine since she was seven years old is described by Alexander (2, **Unusual case of ophthalmic migraine**).

It is interesting from the fact that following an attack she retained permanently a homonymous quadrant defect in the right upper field. One year later the scotoma was still present but not so large. Permanent hemianopsia following migraine is not unknown.

Alling.

The most important ocular changes in pregnancy and labor are, according to Adam (1, **Ocular changes in pregnancy and labor**), albuminuric retinitis of pregnancy and the visual disturbances of eclampsia. The picture of the former is that of albuminuric neuroretinitis, but is much less common. It terminates usually in neuritic atrophy, sometimes white spots remain permanently in the region of the macula. Amblyopia generally results; it is exceptional for normal vision to return, still the prognosis is better than in ordinary albuminuric retinitis. Complications that may occur are detachment of the retina, and in rare cases occlusion of the central vessels. The detached retina frequently becomes reattached and usually is capable of performing its functions again. Interruption of pregnancy is justified by a commencing retinitis, but in advanced cases it has no great influence over the degree of vision to be expected later. Therefore the pregnancy should be interrupted in patients who have marked nephritis before the onset of the retinitis, and a future pregnancy should be prevented. Adam finds visual disturbances in fifty per cent. of the cases of eclampsia. As these are generally of cerebral origin in uræmia the fundus is apt to be found normal and the reaction of the pupils to light preserved. After delivery the vision returns fully in pure cases of eclampsia. In four serious cases he found a peripheral sclerosis of the choroidal vessels with atrophy of the retinal pigment layer. Microscopically there were choroidal hemorrhages and thromboses of the vessels of the choroid. Combinations of eclampsia with retinitis albuminurica occur, which leave a certain degree of amblyopia.

HOLDEN (7, **Ocular manifestations of the toxæmia of pregnancy**) examined a woman seven months pregnant who complained of diplopia. The urine showed 20% albumin and cells, and her feet were swollen. She did well under eliminative treatment. He found paresis of the left external rectus and absolute central scotoma in both eyes. A slight macular œdema was observed. Labor was induced and about one month later the vision was normal and the paresis had disappeared. There was night blindness. Close scrutiny disclosed pigment proliferation at the macula. The condition was probably a toxic œdema of the meninges producing pressure on the optic and sixth nerves back of the apex of the orbit.

ALLING.

EWING (5, **Sodium chloride a possible cause of some obscure**

diseases of the choroid and retina) recites a number of cases which are more or less convincing in way of proof that excessive use of common salt is the cause of various intraocular diseases.

ALLING.

After taking a teaspoonful of quinine, SPEYR'S (13, **Acute quinine poisoning**) patient appeared to be drunk, and was both deaf and blind. Hearing gradually returned, but the visual fields remained so contracted that after three months the right was only 3–5°, the left 5–8°. Central vision was: right 0.9, left 0.8. All colors were recognized well centrally with the left eye, but blue and green were hard to distinguish with the right. There was myosis of both eyes with slow reaction of the pupils to light. The retinal vessels were greatly contracted and most of the arteries had a distinct white sheathing. There was no atrophy of the papilla, the macula formed a red spot in the midst of a bright, cloudy area.

THEOBALD (15, **Ætiology of phlyctenular ophthalmia**) thinks that the evidence offered in support of the theory of the tuberculous character of this disease is far from convincing, and until the tubercle bacilli can be demonstrated in the lesion the use of tuberculin is unwarranted. Phlyctenulosis is an ocular eczema and due to autointoxication.

ALLING.

III.—GENERAL AND EXPERIMENTAL PATHOLOGY AND TREATMENT.

17. BATTEN. **An experiment on ocular tension and intraocular pressure.** *Ophthalmoscope*, November, 1914.

18. BETTI. **Gramnegative sarcinæ of the conjunctiva.** *Annali di Ottalm.*, fasc. 1–2, 1914.

19. DUTOIT. **The value of lime treatment in scrofulous and rachitic diseases of the eye.** *Wochenschrift f. Ther. u. Hyg. d. Auges*, 1914, p. 261.

20. GEBB. **Experimental studies of the destructive action of optochin upon pneumococci.** *Archiv f. Ophthalmologie*, lxxxix., 1, p. 29.

21. GRADLE, H. S. **The modern therapy of pneumococcic infection of the eye.** *Ophthalmology*, October, 1914.

22. IN DER BEECK. **Results of treatment with salvarsan and neosalvarsan in syphilitic diseases of the eye, and some cases of general syphilitic infection.** *Wochenschrift f. Ther. u. Hyg. d. Auges*, 1914, p. 277.

23. SCHERESCHEWSKY. **Chancre and interstitial keratitis produced in rabbits by pure cultures of spirochætæ.** *Deutsche med. Wochensch.*, 1914, p. 1835.

24. SCHOENBERG, M. J. **A contribution to the experimental study of ocular anaphylaxis.** *Ophthalmology*, October, 1914.

25. SCHUR. **Further experiences with optochin.** *Klin. Monatsbl. f. Augenheilkunde*, September, 1914, p. 432.

26. VERHOEFF, F. H. **Chronic ocular tuberculosis. Necropsy. Findings in a case in which death was due to tuberculosis of the hypophysis cerebri.** *Journal of the A. M. A.*, July 4, 1914.

According to VERHOEFF (26, **Chronic ocular tuberculosis**) this case is the only one on record in which a general autopsy has been performed as well as a pathological examination of the eyes where there was a chronic ocular tuberculosis. Both eyes had suffered from recurrent attacks of tuberculous scleritis and keratitis. The tuberculin test, four months before death, gave only a slight general reaction. The patient had mitral disease of the heart, cessation of menses, polyuria, polydipsia, and mental dullness. The pathological diagnosis was complete destruction of the hypophysis by a tuberculous process, tuberculosis of the lungs, old endocarditis, hyperplasia of lymph follicles of intestines, chronic bilateral tuberculous scleritis, keratitis, iritis, and cyclitis. The author believes that chronic tuberculosis of the eye is of special type. It almost never occurs in cases with well-marked clinical signs of systemic tuberculosis. It cannot be a chance metastasis because it generally affects both eyes. There is no rise of temperature and it requires large doses of tuberculin to produce constitutional reaction. Tubercle bacilli are rarely found in the lesions, and animal inoculations give negative results. He thinks that the tissues and the organisms having existed so long under the same conditions have established a mutual immunity.

ALLING.

BATTEN (17, **An experiment on ocular tension and intraocular pressure**) experimented with two pigs' eyes eviscerated through the optic nerve so that only the cornea and sclera were left with the sheath of the optic nerve. These were connected by a tube to the same mercurial tonometer and pump and the pressure raised equally in both eyes. One eye had free communication with the manometer and the other through a lightly acting valve. A number of skilled observers tested and compared the tension of the eyes and only two estimated the pressure in both as equal and there was considerable error in estimation of the actual pressure. Those with the lightest touch were the more accurate. He concludes that the finger cannot accurately estimate the pressure nor can the manometer accurately estimate the tension of an eye. He suggests that, if the choroidal plexus of veins contains little blood or if the exit is impeded, the eye will have increased tension whether the pressure is above normal or not, and where there is free exit it will require great increase of pressure to produce increased tension.

CURRAN.

BETTI (18, **Gramnegative sarcinæ of the conjunctiva**) has found these sarcinæ in the conjunctival secretion in fifteen cases in a little more than a year. From their cultural characteristics and biochemical action they are divided into those that form a gray pigment in the nutrient media and those that do not. They may induce slight signs of inflammation of the conjunctiva, which are often obstinate.

CALDERARO.

SCHERESCHEWSKY (23, **Syphilis produced in rabbits**) was able to produce chancre and interstitial keratitis in rabbits by pure cultures of spirochætæ. The culture was placed on a bit of cotton, which was seized with forceps and applied to the scarified cornea and sclera for three minutes, new material being constantly added. A parenchymatous keratitis appeared in the rabbits thirty-three days later.

DUTOIT (19, **Lime treatment in scrofulous and rachitic diseases of the eye**) finds that scrofulous conjunctivitis and keratitis, as well as the general condition, are greatly benefited by treatment with tricalcol. He has had less experience in rickets, but thinks well of the same remedy.

GRADLE (21, **The modern therapy of pneumococcic infection of the eye**) praises ethyl-hydro-cuprein discovered by Morgenroth in the treatment of blennorrhea of the tear sac. The drug is used in a 1% ointment or solution. As its use is painful the eye should be anæsthetized. He finds also that superficial pneumococcal ulcers are readily healed by its use, but the deeper varieties need the cautery as well. He has used with success internally large doses of hexamethylamine which is excreted in the anterior chamber and in the tears as urotropin and formaldehyde. He finds it useful in injuries as a preventive against all forms of purulent infection.

ALLING.

SCHUR (25, **Optochin**) has treated twenty-eight pneumococcal ulcers of the cornea with optochin, touching the ulcer with a two per cent. solution of the hydrochlorate and subsequently instilling the same. The result was good in every case, except that it was hard to influence the accompanying iritis.

KOELLNER.

GEBB (20, **Experimental studies of optochin**) finds that in the test-tube a two per cent. solution of optochin kills pneumococci very quickly, that a drop of a one per cent. solution inhibits their growth after five minutes, while two drops destroy them in one minute. One-half per cent. solutions fail completely in the test-tube. A one per cent. solution causes in man a very severe burning which passes off in about twenty minutes, and a conjunctival injection that lasts about an hour. Permanent injuries by such a solution were not observed.

IN DER BEECK (22, **Results of treatment with salvarsan and neosalvarsan**) reports thirty-one cases. A good effect was produced in syphilitic iritis, retinitis, and choroiditis; hemorrhages into the retina and vitreous recurred. The effect was not so good in sclerokeratitis. A good effect was obtained in one case of interstitial keratitis, although the other eye was subsequently attacked. An improvement appeared at first, but did not persist in tabetic optic atrophy. Only a slight effect could be detected in pareses of the ocular muscles.

SCHOENBERG'S (24, **Ocular anaphylaxis**) paper consists of a review of our present knowledge of anaphylaxis and a description of experimental studies. He made use of eighteen rabbits and injected human serum and tuberculin. He found that there was a local reaction in the cornea and iris when Wassermann was positive or negative if serum was injected first into the vein and next into the cornea or anterior chamber. This he considers an anaphylactic manifestation. With tuberculin when the first injection is into the vein the eye is more easily sensitized than when it is made into the eye itself. Even a strong solution of tuberculin may be injected into the anterior chamber without causing reaction, provided the eye has not been previously sensitized by venous injection showing that tuberculin *per se* is not a strong irritant. On account of the limited number of experiments the work is only suggestive.

ALLING.

IV.—METHODS OF RESEARCH, REMEDIES, INSTRUMENTS, AND GENERAL OPERATIVE TECHNIQUE.

27. HENKER. **Use of shooting glasses.** *Zeitschr. f. Ophth. Optik*, 1914, p. 65.

28. PERCIVAL. **Periscopic lens.** *Ophthalmoscope*, July, 1914.

29. POOLEY. **An improvement in local anæsthesia in operations upon the eye.** *Ophthalmoscope*, August, 1914.

30. STEIREN, EDW. **Enucleation with transplantation of fat into the orbit.** *Journal A. M. A.*, August 15, 1914.

31. WALKER, C. B. **Further observations on the hemiopic pupillary reaction obtained with a new clinical instrument.** *Ibid.*, September 5, 1914.

HENKER (27, **Use of shooting glasses**) calls attention to the fact that when an ordinary glass is worn while shooting, the position taken by the head is such that the eye looks through the upper-inner portion of the glass, and its vision is not as good as though it were looking through the glass properly. His remedy is the use of a special make of glass, and he recommends that this glass be of a yellow color, as he thinks this color is particularly pleasant for shooters.

WALKER (31, **Further observations on the hemiopic pupillary reaction obtained with a new clinical instrument**) describes an instrument for testing pupillary reaction to light which is an improvement over the one formerly devised. He concludes from his studies that the peripheral retina possesses a weak pupillomotor sensitivity, contrary to the opinion of Hess who believes that the pupillary fibers are at and near the macula. He finds the hemiopic pupillary reaction present in posterior lesions of the optic tract as well as in the anterior, but destroying the diagnostic value of the test since the presence of the reaction has always been thought to indicate a lesion in, or anterior to, the primary optic ganglia.

ALLING.

POOLEY (29, **An improvement in local anæsthesia in operations upon the eye**) injects a local anæsthetic through Tenon's capsule as close to the posterior pole of the eye as possible in order to act upon the ciliary nerves. He has used alypin about one per cent., adrenalin, and normal saline in forty-seven intraocular operations with perfect anæsthetic results. There were no complications in the way of proptosis, toxic effects, or loss of visual acuity.

CURRAN.

STEIREN (30, **Enucleation with transplantation of fat into the orbit**) takes the fat from the abdominal wall including with it some subcutaneous tissue which is placed outward when the fat is transferred to Tenon's capsule. He thinks that there is a certain amount of absorption varying from one third to one quarter of its bulk during the first six weeks. He has performed the operation in 66 cases.

ALLING.

PERCIVAL (28, **Periscopic lenses**) in a mathematical discussion of the subject of periscopic lenses shows how menisci can be ground at little cost with ordinary spherical surfaces up to + 7 D. or + 8 D. which will be satisfactory for reading and will serve to take the place of the more expensive and perfect von Rohr's lenses. The following are the results of his calculations for + 3 D., + 6 D., + 8 D., and + 12 D. for 300*mm* and for 00:

	u = 300	u = 00
+ 3 D.	+ 8–5	+ 9–6
+ 6 D.	+ 11–5	+ 13–7
+ 8 D.	+ 13.5–5.5	+ 15–7
+ 12 D.	+ (17–5)	+ (17.5–5.5)

CURRAN.

V.—ANATOMY, EMBRYOLOGY, MALFORMATIONS.

32. AUGSTEIN. **Bilateral amaurosis with luxation of the lens and an extraordinary development of intercalar staphyloma from increased tension after congenital aniridia.** *Klin. Monatsbl. f. Augenheilk.*, liii., p. 405.

33. BRAV, A. **Congenital phthisis bulbi.** *Jour. A. M. A.*, Nov. 28, 1914.

34. HOLLOWAY, T. B. **Cranial deformity associated with ocular changes.** *Transactions of the American Ophthalmological Society*, 1914.

35. KELLER. **Persistent pupillary membrane.** *Ophthalmic Society of Vienna*, May 11, 1914.

36. URMETZER. **A case of congenital shortness of the lid.** *Ibid.*, May 5th.

In URMETZER'S (36, **Congenital shortness of the lid**) case the eye was unable to close completely because of a congenital abnormal shortness of the lids. The margins of the lids were reddened so as to simulate a blepharitis.

KELLER (35, **Persistent pupillary membrane**) demonstrated a thread from a persistent pupillary membrane that contained for a short distance a blood-vessel capable of carrying blood. A little hemorrhage had been occasioned from this vessel by a slight traumatism.

AUGSTEIN (32, **Congenital aniridia**) describes a case of congenital irideremia in which the rather familiar history of a normal position of the lens, with a polar cataract ten years before, was succeeded by a luxation of the lens upward and the development of absolute glaucoma. In this case, as in one reported by Hirschberg, the luxation of the lens took place in the course of the glaucoma. (In congenital irideremia luxation of the lens develops very commonly and almost invariably upward; it may be a little to one side or the other. This luxation usually precedes, but may follow the onset of glaucoma; the two conditions do not seem to be associated causally for each may appear independently, and the irideremic eye seems to be peculiarly subject to both. None of the theories concerning the ætiology can withstand criticism.—F.)

BRAV (33, **Congenital phthisis bulbi**) saw a child, three days after birth, with greatly shrunken eyeballs, the right being about the size of a large pea and the left still smaller. There were signs of suppurative inflammation in the orbit with purulent discharge. The infection was due to a diplococcus but not the gonococcus. The mother had suffered from a pustular eruption before delivery and the indications were that the condition of the eyes was brought about through inflammation rather than through non-development.

ALLING.

HOLLOWAY (34, **Cranial deformity associated with ocular changes**) relates two cases showing cranial deformity, exophthalmos, divergent squint, post-neuritic atrophy, and contraction of the field of vision. The X-ray plates were typical of the tower-skull or Türmschadel: a thick skull, evidence of premature ossification, pituitary fossa depressed forward and downward, the middle fossa wide and deep, and the anterior fossa shallow and narrow.

ALLING.

VI.—NUTRITION AND INTRAOCULAR TENSION.

37. HERTEL. **Experimental studies concerning the dependence of the ocular tension upon the condition of the blood.** *Arch. f. Ophthalm.*, lxxxviii., p. 197.

38. KOCHMANN and ROEMER. **Experimental studies of the pathological change of fluid in the eye.** *Ibid.*, p. 528.

39. SATTLER, Junior. **The action of anæsthetics in subconjunctival injections.** *Ibid.*, p. 259.

According to SATTLER (39, **Action of anæsthetics in subconjunctival injections**) the effect of subconjunctival injections of salt solution is much impaired by the addition of cocaine to the solution or the cocainizing of the conjunctiva, and the excretion of albumin into the aqueous is much less. This diminution in the excretion of albumin is particularly marked when paracentesis of the anterior chamber is performed some twenty minutes after the injection. When the paracentesis is performed later the effect of the cocaine has begun to wear off, the injected salt solution is thinned by diffusion, and the reduction of the excretion of albumin caused by the cocaine anæsthesia is less considerable. The cause of this limitation of the hyperæmia of the ciliary body is not in the relatively slight effect of the cocaine in contracting the vessels, but rather is to be sought in its anæsthetic effect. An irritant action is produced simultaneously by various anæsthetics which produces an increase of the albumin in the aqueous, varying in degree. Acoin is the most effective in this way but this is to be used with care as it is apt to set up adhesions between the conjunctiva and sclera.

HERTEL (37, **Dependence of the ocular tension upon the condition of the blood**) introduced crystalline and colloidal solutions of various strengths into the blood of rabbits and observed the changes produced in the tension of the eye and the pressure of the blood. A 10% salt solution always induces a considerable reduction of the ocular tension, solutions of a lower percentage an increase of tension. The rise and fall of the tension was in no way dependent upon fluctuations of the blood pressure. He thinks that in all probability the effect is wholly dependent on the osmotic concentration of the solution whatever material may be used.

KOCHMANN and ROEMER (38, **Pathological changes of fluid in the eye**) say that the serum of persons suffering from diabetic coma is able to reduce the tension of a rabbit's eye, when injected intravenously, without changing the blood pressure noticeably. Even the increase of tension that follows the subconjunctival injection of hypertonic solutions of salt may be obviated in this way. The theoretical explanation is discussed.

VII.—THE SENSE OF SIGHT.

40. ARPS, G. F. **A note on a case of double inversion.** *Annals of Ophthalmology*, July, 1914.

41. BEHR. **Early diagnosis of tabes dorsalis.** *Med. Klin.*, pp. 1821 and 1845.

42. CORDS. **Notes on the examination of perception of depth.** *Zeitschr. f. Augenheilkunde*, xxxii., p. 34.

43. FERREE, C. E. **The efficiency of the eye under different systems of lighting.** *Ophthalmology*, July, 1914.

44. FISHER, J. H. **Observations on the learning of vision after a successful operation, at the age of six years, in a congenitally blind patient.** *Ophthalmic Review*, xxxiii., p. 161.

45. MASSO, G. **The light sense of albinos and the influence of the retinal pigment on the sensibility to light and the adaptation of the eye to the dark.** *Annali di Ottalm.*, f. 1–2, 1914.

46. TSCHERMAK. **The importance of diffraction in human vision.** *Berl. Sekt. d. naturwissensch.-med. Verein Lotos*, Prague, June 10, 1914.

The diffraction in the eye comes into consideration only when the pupil is comparatively small, according to TSCHERMAK (46, **Diffraction in human vision**). When the pupil has a diameter of 2*mm* the diameter of the diffraction area of light is 0.0122*mm*, hence it extends over three cone limbs. The dioptric fault thus occasioned in the eye is compensated for by simultaneous contrast, the same as other dioptric faults, so that a sharp picture is created.

MASSO (45, **Light sense in albinos and the influence of the retinal pigment on the sensibility to light and the adaptation of the eye**) has investigated whether there is any relation between the pigmentation of the eye and the curve and indices of the sensibility to light in the dark. In fifty individuals with normal vision and of ages within which the range of accommodation is almost the same, he has found that no constant relation can be established between the pigmentation of the fundus and the indices of adaptation. In four albinos he observed that the type of the curve of the course of the adaptation was the same as that produced by slow adaptations and with commonly low figures, except that in the first moments the figures were relatively higher than normal. By placing diaphragms with stenopaic apertures in front of the eyes he secured lower indices of sensibility than normal.

CALDERARO.

BEHR (41, **Early diagnosis of tabes**) believes an early symptom of tabes to be a disturbance of adaptation consisting of a uniform but slow increase of sensibility when the patient is taken from the dark room.

CORDS (42, **Perception of depth**) concludes that persons who have been one-eyed for more than a year appreciate the parallactic displacement in the perception of depth more than a person who has one of his two eyes covered. In a proper test not only are his gross errors less, but his judgment is prompter. The best and quickest judgments are found when the person has had only one eye from early childhood. But there are persons who have had only one eye for more than a year whose judgments are poorer than the average of those who have one eye covered. He is of the opinion that we will never be able to make a numerical computation of the parallactic displacement utilized.

In this paper FERREE (43, **Efficiency of the eye under different systems of lighting**) discusses principally the distribution of light and surface brightness as they affect the efficiency of the fresh eye and the production of discomfort, leaving the other factors in lighting for further study. He thinks that these are the most important. For example, if the light is well distributed in the field of vision and there are no extremes of surface brightness, tests seem to indicate that the eye is practically independent of light intensity. He thinks in general that too much light is being advocated at present for the welfare of the eye. Daylight and artificial illumination of the indirect type are shown to be much more favorable for the comfort of the eye than either the semi-direct or the direct method—presumably because of the better light distribution.

ALLING.

ARPS (40, **Double inversion**) describes the case of a somewhat backward boy of seven who when asked to copy words and numerals invariably wrote them upside down and backwards. No explanation is offered.

ALLING.

FISHER (44, **Learning of vision after a successful operation on a congenitally blind patient**) found that the patient, six years old, began to recognize objects by the sense of sight about four weeks after the operation. The visual field was tubular at first.

VIII.—REFRACTION AND ACCOMMODATION.

47. BARRETT. **Diplopia-polyopia in connection with astigmatism.** *Ophthalmoscope*, July, 1914.

48. JACKSON, EDWARD. **International standard for testing vision and standardizing other visual tests.** *Journal A. M. A.*, August 29, 1914.

49. PAPE. **A case of paresis of the accommodation after diphtheritic vulvovaginitis.** *Klin. Monatsbl. f. Augenheilkunde*, liii., p. 427.

JACKSON (48, **International standard for testing vision**) brings out the fact that the usual test of visual acuity by means of a card of letters is very inaccurate and pleads for the adoption of the broken circle or square as a universal standard.

ALLING.

BARRETT (47, **Diplopia-polyopia in connection with astigmatism**) has studied this matter subjectively by addition of cylinders to his own eyes and also objectively by photographs taken with an astigmatic camera. While pointing out that it is more difficult to demonstrate the doubling and tripling of images by such a photographic camera, he is satisfied that there is no essential difference in the phenomena thus revealed and that produced by an astigmatic ocular combination; and that the explanation lies in symmetrical irregularities in the structure of the lens and not in spherical aberration associated with a sphero-cylindrical system.

CURRAN.

PAPE (49, **Paresis of the accommodation after diphtheritic

vulvovaginitis) saw a paresis of the accommodation follow a vulvovaginitis in a 12-year-old girl. The diphtheritic nature of this inflammation was inferred from the development of the paresis.

IX.—THE MOTOR APPARATUS OF THE EYE.

50. BIELSCHOWSKY. **Alternating sursumvergent strabismus.** *Versamml. hess. u. hessen-nass Augenaerzte*, June 7, 1914.

51. DUANE, A. **Convergence insufficiency.** *Journal A. M. A.*, Aug. 29, 1914.

52. JACKSON, EDWARD. **Operations on the extraocular muscles.** *Ophthalmic Record*, November, 1914.

53. LERPERGER. **Congenital retraction of the eye.** *Ophthalmic Society of Vienna*, May 11, 1914.

54. PASETTI, G. **Essential paralysis of convergence.** *Annali di Ottalm.*, f. 12, 1913.

55. REBER. **The present status of the heterophoria question.** *Ophthalmoscope*, August, September, and October, 1914.

56. REBER, W. **Concerning the use of invisible bifocals in the treatment of convergent strabismus in little children.** *Ophthalmic Record*, December, 1914.

57. WILLIAMS, E. M. **Lead poisoning with paralysis of the external ocular muscles.** *Journal A. M. A.*, August 1, 1914.

58. WOODRUFF, F. E. **A report of a traumatic paralysis of both external recti.** *Annals of Ophthalmology*, October, 1914.

59. WORTH, CLAUDE. **Operation of squint.** *Ophthalmic Record*, Dec., 1914.

60. ZENTMAYER, WILLIAM. **Contraction of the frontalis in abduction of the eyeball.** *Transactions American Ophthalmological Society*, 1914.

61. ZIEGLER, S. L. **A new operation for capsulo-muscular advancement, combined with partial resection.** *Ibid.*

WORTH (59, **Operation of squint**) states that simple tenotomy in convergence very rarely gives good results, except, temporarily, since five, ten, or fifteen years later divergence may ensue even when there has been tenotomy with advancement. He employs advancement in one or both eyes depending on the amount of the error. The operation which he uses is well known but he now finds undyed silk better on account of its strength but he ties a bit of black silk in the knot to facilitate removal. He is careful to completely bare the sclera where the advanced muscle is to reattach in order that the adhesion may be firm. He has found by experiment that his sutures are buried in about two thirds the thickness of the sclera.

ALLING.

Lerperger (53, **Congenital retraction of the eye**) reports a case of this nature observed in a man 23 years old. The eye was in a position of convergence, 20°, its movements were very limited, and nearly abolished outwards. Movement toward the nose caused the eyeball to sink 3 or 4*mm* into the orbit. Attempts to move it outward caused an enophthalmos of 2*mm*. The external rectus seemed to be replaced by a tense band.

Jackson (52, **Operations on the extraocular muscles**) points out the fact that no movement of the eye is produced by a single muscle; for example, adduction is performed not only by the internal rectus but also to a certain degree by the inferior and superior recti and in abduction the oblique muscles aid the external rectus. In operating on any muscle these factors must be reckoned with. The real danger in tenotomy lies not in weakening the muscle but in transferring the control of the lateral movement from the primary to the secondary adductors and abductors. Alling.

Ziegler (61, **New operation for capsulo-muscular advancement**) uses a double-needled single thread which he passes through the muscle well back from the insertion in such a way as to obtain a firm hold. Each end of the suture is then carried through Tenon's capsule and conjunctiva and passed into the sclera at the limbus from above and below. Before tying the suture a piece of the tendon is removed on either side back of the insertion to avoid crumpling of the muscle.

Alling.

Reber (55, **The present status of the heterophoria question**) in an exhaustive review of this subject says that about 70% of muscular and refractive cases are relieved of their symptoms by correction of refraction alone, and the remaining 30% require some attention to their oculo-muscular condition to bring about complete relief. He says that no case of heterophoria should be dealt with from the muscular standpoint until the proper refractive correction be worn for one or two months at least. He points out that when a patient is in good health he is able to overcome a considerable amount of muscle unbalance, while on the other hand some patients improve much in general health after correction. From an analysis of his own cases he finds the greatest number of exophoria following the third decade of life. Exophoria manifests itself from thirty to fifty years of age when accommodation begins to wane. Hyperphoria manifests itself most at about the same period. Heredity plays a part in many heterophorias, and he quotes cases which show this. In summing up this lengthy paper he concludes as follows:

Esophoria is quite amenable to kindly influence of good refractive correction. Exercises are sometimes required, permanent prisms quite infrequently, and operation almost not at all.

Exophoria is much more assertive; not so amenable to refractive corrections alone, generally requires training to which it is disposed to respond readily, will often require permanent prisms and sometimes operation.

Hyperphoria seems almost independent of refractive status, does not respond well to training, very frequently demands prisms, and a little oftener than exophoria will call for operation. This is the superstructure to be built up on the solid foundation of the best possible general health and life habits.

CURRAN.

ZENTMAYER (60, **Contraction of the frontalis in abduction of the eyeball**) describes a rare case of associate action. A man of twenty had had a convergent concomitant squint of the left eye since childhood. Lateral movements on both sides are limited especially to the left. After the left eye passes the median line there is a marked contraction of the frontalis on the same side. During convergence the lower fibers of the frontalis show a slight tremor. ALLING.

BIELSCHOWSKY (50, **Alternating sursumvergent strabismus**) demonstrated three cases of this nature. The covered eye moved upward in each case, and when a dark glass was placed before the fixing eye there was a downward movement.

PASETTI (54, **Essential paralysis of convergence**) reports two clinical cases of paralysis in which two of the chief symptoms insisted on by Parinaud were absent: the paralysis of the accommodation and the lack of pupillary reflex to accommodation and convergence. Likewise the relative or functional capacity of the external rectus was either abolished or greatly reduced. From the study of these two patients the writer concludes that there are centers for the convergence alone, and that these centers are outside of the nuclei of origin of the motor nerves and of the centers of association for the pupillary movements. CALDERARO.

DUANE (51, **Convergence insufficiency**) after describing the diagnosis, ætiology, and symptoms of this error of motility discusses the different methods of treatment as follows: (1) correction of refraction; (2) correction of exciting causes such as neurasthenia, organic nervous diseases, etc.; (3) exercising by converging on a near point and with prisms; (4) practice with the amblyoscope; (5) prisms for constant wear which he condemns; (6) operation of advancement with tenotomy in cases which do not respond to less radical treatment. ALLING.

WOODRUFF (58, **Traumatic paralysis of both external recti**) reports the case of a boy 4½ years old who showed a paralysis of both external recti following a fall. There was no evidence of fracture of the skull or other injury to the head except an abrasion on the nose. There were no other paralyses. There was probably a hemorrhage at the base. ALLING.

In WILLIAMS's (57, **Lead poisoning with paralysis of the external ocular muscles**) case there were wide-spread atrophic muscle changes and other signs of lead poisoning. The external rectus muscle was paretic. ALLING.

REBER (56, **Invisible bifocals in the treatment of convergent strabismus**) advocates the use of bifocals adding about + 2 D. to the full correction for distance. He has tried this method in the treatment of eleven cases of functional strabismus in conjunction with atropine, amblyoscope, etc., and has had highly satisfactory results except in one case of very marked convergence. ALLING.

X.—LIDS.

62. BUTLER. **The treatment of trichiasis.** *Ophthalmoscope*, November, 1914.

63. CARUCCIO, A. **Restoration of a lid in toto according to Cirincione's method.** *La clin. oculist.*, f. 1–2, 1914.

64. STEINDORF, K. **Vitiligo of the lids and poliosis after a contusion.** *Klin. Monatsbl. f. Augenheilkunde*, July–August, 1914, p. 188.

65. STIEREN, E. **Blepharochalasis. Report of two cases.** *Transactions American Ophthalmological Society*, 1914.

STEINDORF (64, **Vitiligo and poliosis after a contusion**) reports a case in which a child 4 or 5 years old received a blow on the left temple and some time later developed vitiligo of the skin of the lid with whiteness of the brows and lashes of both lids. He ascribes the vitiligo and the poliosis to the contusion.

CARUCCIO (63, **Restoration of a lid in toto**) reports a case in which he restored a lid that had been entirely removed with the conjunctiva. He used the conjunctiva of the normal lid, that remained intact, and transplanted upon this as a base a pedicled flap of skin. From the result he obtained he is inclined to think this to be the only operation by which the entire lid can be restored, as it possesses all of the advantages of other procedures without their disadvantages.

CALDERARO.

The first patient of STIEREN (65, **Blepharochalasis**) was a girl of 19 and the swelling of the lids had been present about nine years. There was redundancy of the tissues of the upper lid which contained masses of fat. A large elliptical piece of skin was excised and the fat dissected out with satisfactory result. The other case was apparently non-progressive and there were no fat masses in the lid itself although they could be felt under the rim of the orbit. This case was not operated upon.

ALLING.

BUTLER (62, **The treatment of trichiasis**), after performing a thousand operations for trichiasis, finds that the following methods meet all cases: Von Milligen's, Snellen's, a modified Spencer-Watson, and simple excision with a lip graft.

In his hands Von Milligen's is the only satisfactory splitting operation and he thinks it by far the best operation for trichiasis. It is especially useful in conjunctival atrophy and in relapses after other operations. In Cant's modification of Snellen's operation the tarsus must be broad, there must be no conjunctival atrophy, and the operation must not be repeated. If the trichiasis extends to the canthi, the operation must be combined with canthoplastics at either or both angles. Relapses after Snellen's operation are frequent. He has never seen relapses from Von Milligen's operation. When trichiasis is confined to the canthi he likes the Spencer-Watson operation. In cases of isolated cilia he uses simple excision with lip graft.

CURRAN.

XI.—LACRIMAL ORGANS.

66. FORONI, CAM. **A new operation for dacryocystitis.** *Zeitschrift f. Augenheilkunde*, xxxii., p. 226.

67. LOEWENSTEIN. **Dacryocystorhinostomy according to Toti.** *Wiss. Ges. dtsch. Aerzte in Boehmen.*, June 6, 1914.

68. ROCHAT, F., and BENJAMINS, C. E. **Some experiences with the endonasal opening of the lacrimal sac according to West-Polyak.** *Klin. Monatsbl. f. Augenheilkunde*, September, 1914, p. 383.

LOEWENSTEIN (67, **Toti's dacryocystorhinostomy**) reports thirty-five new cases operated on in this manner. The tears escaped spontaneously in 61%. Epiphora was not left in any case, and all could be freely irrigated through the canaliculi.

ROCHAT and BENJAMINS (68, **Endonasal opening of the lacrimal sac**) have done this operation seven times, five successfully, twice not. The ethmoid cells were opened in six, but disease found there in only one. The operation does not seem suited to replace the usual probing, because of its difficulties, but in some cases the results are brilliant.

Because of several mishaps that he had had with Toti's operation FORONI (66, **New operation for dacryocystitis**) devised a new method. After irrigation of the lacrimal sac and anæsthetization, he cuts both canaliculi and the outer wall of the sac at their mouths. Then he enlarges the opening into the sac and cuts the internal palpebral ligament. He then passes the knife through the entire length of the duct and incises the mucous membrane in various directions down to the bone. After a brief introduction of a Bowman's probe a gauze drain is inserted, which is changed daily for eight to fourteen days, when a style is inserted. The results given from over a hundred and fifty cases are excellent. Foroni considers it indicated only in uncomplicated cases.

(*To be continued*)

EDITORIAL NOTICE.

The Archives of Ophthalmology is a bi-monthly journal, published in annual volumes of about six hundred pages each, extensively illustrated with cuts in the text, half-tone text plates, and lithographic plates, many in colors.

About three quarters of the space is devoted to original papers, and the remaining quarter to a systematic report on the progress of ophthalmology, and to reports of societies, book reviews, and miscellaneous notes, all of it original.

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Würzburg; and M. WOLFRUM, Leipsic; with the Assistance of Drs. ALLING, New Haven; CURRAN, Kansas City; CALDERARO, Rome; CAUSÉ, Mayence; DANIS, Brussels; GILBERT, Munich; GRÖNHOLM, Helsingfors; v. POPPEN, Petrograd; TREUTLER, Dresden; and VISSER, Amsterdam. Edited by MATTHIAS LANCKTON FOSTER, M.D., F.A.C.S., New Rochelle, N. Y. . . . 580

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VOL. XLIV. No. 5

ARCHIVES OF OPHTHALMOLOGY.

SOME PRACTICAL POINTS IN EYE-WORK.[1]

ARGYROL—COPPER SULPHATE—PUPILS—PUPILLARY DISTANCE —ANGLE OF CONVERGENCE—OPHTHALMOSCOPY— EXAMINATION OF CORNEA—SCOTOMATOMETRY.

BY ALEXANDER DUANE, M.D., NEW YORK.

PROBABLY most, if not all, of the methods here given are well known to many practitioners. Yet there are some that doubtless do not know them, and it has seemed worth while to publish them all in the hope that, as their usefulness has been proved over and over again in my office, they may be equally serviceable to such others as have not tried them.

APPLICATION OF ARGYROL.

Argyrol dropped into the eye often produces the feeling as if a foreign body were present. We generally then find in the eye a floating mass of pus or muco-pus apparently more or less solidified by the action of the argyrol and mixed with the latter. This may occur even when the eye has already been pretty thoroughly flushed out. What happens in this case, I believe, is that the preliminary cleansing has removed all the secretion on the surface, but has failed to reach the secretion concealed in the folds of the conjunctiva. This concealed secretion the argyrol, owing to its density and penetrative power, reaches and expels—floating it out into the conjunctival sac. This penetrative and expulsive effect of argyrol—a purely mechanical effect, of course—constitutes, I think, one of the most valuable features of its action.

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[1] Read at meeting of the Section on Ophthalmology, N. Y. Acad. Med., April 19, 1915.

Because argyrol acts in this way I usually apply it as follows. I first flush out the eye with an indifferent solution (boric acid, normal salt), thus removing the superficial secretion and the contained bacteria; next drop in the argyrol, thus bringing the concealed secretion to the surface; then after waiting a few minutes flush out the eye again freely, thus removing the coagulated deep secretion and the argyrol; and finally instill another drop of argyrol, which is allowed to remain. In this way the secretions and bacteria are more thoroughly removed, and the argyrol that is last put in has unobstructed access to the germs that remain.

In prescribing argyrol for home use, I direct the patient to employ a similar routine of double irrigation and double instillation.

One of the chief uses of argyrol in conjunctival affections is to promote drainage. By sheer weight it passes down through the tear duct, and carries off with it the bacteria that would otherwise remain and multiply in the conjunctival sac. It also clears out the nasal passages themselves. Hence I always count it an advantage when the argyrol that we have dropped into the conjunctival sac passes freely into the nose or throat.

To judge whether this is the case or not, I get the patient to blow his nose some ten minutes after the instillation of argyrol, and note how deeply, if at all, the handkerchief is tinged. I also tell the patient to make the same experiment when using the argyrol at home. He may report that at first there was no staining at all, but that after a few days of treatment the argyrol began to come through profusely. This to me is a sign that the case is on the mend.

In order to facilitate the descent of the argyrol, particularly when there is a slight obstruction of the tear passages, I often, before instilling it, put in a drop of adrenaline. This by shrinking the swollen mucous membrane of the tear passages opens the way for the argyrol and enables it to get through when otherwise it could not. This simple treatment, repeated two or three times daily and combined with an occasional syringing of the duct, will often relieve cases of fairly well-marked lacrimal obstruction without our being obliged to have recourse to slitting of the canaliculus or other operative procedure.

PRINCE'S COPPER-SULPHATE TREATMENT.

Because they are not as well known as they should be, it seems well to call attention again to the merits of Prince's copper-sulphate treatment of trachoma and allied conditions. It is applied as follows.

A ten-per-cent solution of copper sulphate in glycerin is used as a mother liquor. From this the patient is directed to make an aqueous solution daily by adding one drop of the mother liquor to nineteen drops of water. This 1:200 copper-sulphate solution is instilled into the eye three, four, or even six times a day. If it causes too much reaction, it is further diluted. On the other hand, as the eye gets accustomed to it, the solution is made more and more concentrated. I have never used a solution containing more than 1:150 of the sulphate. Prince, however, states that some of his patients used a solution of 1:50 or even stronger.

The aqueous solution does not seem to keep well, and hence should be made up fresh every day.

This treatment was first devised by Prince of Springfield, Illinois, who found it to work well in trachoma and its complications (corneal ulcers and pannus). He also used the undiluted ten-per-cent. glycerin solution as an application after expression in trachoma. The diluted glycerin solution in my hands has given excellent results in non-trachomatous follicular conditions.

MEASUREMENT OF THE PUPIL.

We measure the width of the pupil by applying the principle of Priestley Smith's keratometer. A millimeter scale placed in contact with a + 2.75 D. lens is held in front of the pupil, and the number of millimeters that the latter subtends, when seen through the glass, is read off by the observer who should be stationed not far from the focal point of the lens (36*cm* in front of the latter). A very accurate measurement will thus be obtained, even when the scale is not held very close to the pupil.

REACTION OF PUPIL.

In determining the light reaction of the pupil, particularly when this is either naturally feeble, or has been artificially reduced (by homatropine, etc.), we use the method described by Uhthoff.[1]

The examination is made in the dark room. The patient covers one eye and looks with the other straight at the light. The observer standing a little to one side focuses the light with a strong lens precisely on the cornea, and through another lens watches the play of the pupil as the light is thrown onto the cornea and as it is withdrawn. Under these conditions there can be no convergence reaction on account of the exclusion of the other eye, nor an accommodation reaction, for the eye sees nothing on which it can accommodate, being aware simply of a diffuse blaze of light. On the other hand, the conditions are most favorable for the development of the light reaction, for, as the patient is looking straight at the light, the most sensitive portion of the retina (the macula) is suddenly subjected to a strong light stimulus, which is as suddenly withdrawn.

To fulfill the conditions of the test it must be remembered that the eye not under observation should be completely excluded from the light and the other eye should look straight at the latter.

MEASUREMENT OF INTERPUPILLARY DISTANCE.

The following method of measuring the interpupillary distance described by the German ophthalmologists is entirely satisfactory:

Observer and patient face each other. The observer's right eye and the patient's left eye are closed or covered. The two uncovered eyes (patient's right, observer's left) look straight at each other. The observer holds a millimeter scale between himself and the patient, with its zero mark in line with the center of the patient's right pupil. Then without moving the scale he directs the patient to open his left eye and close his right, while he himself opens his own right eye and closes his left. The patient being now directed to look straight into the observer's right eye, the observer notes what part of the scale is opposite the center of the patient's left pupil. The reading will give the interpupillary distance in *mm* when the visual axes are parallel. It therefore also gives the distance between the centres of rotation of the two eyes. This reading will be unaffected by the presence of a squint provided there is no absolute inability on the part of either eye to perform fixation.

---

[1] Graefe-Saemisch, *Handb. d. ges. Augenheilk.*

MEASUREMENT OF THE ANGLE OF CONVERGENCE.[1]

The angle C which the two visual axes make when converging on any comparatively near object can readily be determined as follows:

Put on the patient a spectacle frame in such a way that it shall be 11.5*mm* in front of the cornea when the patient is looking straight forward. Measure the distance from the plane of this frame (*i. e.* from the point where it crosses the nose) to the object on which the eyes are converging. This distance in *mm* plus 25 will be (B) the distance of the object from the base line connecting the centers of rotation of the two eyes. Measure the interpupillary distance (A). Then

$$C = \frac{A \times 50}{B} + 3$$

C being expressed in degrees of arc, and A and B in *mm*.

Thus, suppose the distance of the object from the spectacle frame is 65*mm*. Then A = 65 + 25 = 90. If now B is 60*mm*, then

$$C = \frac{60 \times 50}{90} + 3 = 36^\circ$$

This relation will hold good for all values of A between 50 and 400*mm* (2 or 16 inches). For points within and without these limits—which latter, however, include practically all cases for which the rule would be applied—the value of C is from 1° to 3° less than given by the formula.

---

[1] Described in ARCH. OF OPHTH., xliii., 5 (1914).

OPHTHALMOSCOPY WITH THE REFRACTION CORRECTED.

When the patient has a moderate amount of astigmatism—and still more, of course, when he has a good deal—it is surprising to find how the ophthalmoscopic picture gains in clearness and definition if the examination is made with the patient's correcting glasses on. In using the indirect method, of course, we can and should reduce astigmatic deviation to a minimum by placing our object glass in the proper position (*i. e.*, at a distance from the eye equal to the focal length of the glass plus 13*mm*). But even with the indirect method, the correction of the patient's astigmatism helps materially, and when we use the direct method the gain is very considerable indeed. It is quite astonishing to see how the details of the disk come out and how distinctly both vertical and horizontal vessels are simultaneously seen, when an astigmatism of even 5 or 6 D. is thus corrected. With a little adroitness the troublesome reflex from the surface of the glass is avoided and the examination made as easily as with the naked eye.

This method is useful not only in high astigmatism, but also in high myopia or hyperopia. The details of the fundus in a patient with 12 D. of myopia are better seen if the correcting glass is set in a spectacle frame on his face than if a corresponding lens is used in the ophthalmoscope itself. This is so because the ophthalmoscope cannot be held at a fixed distance from the patient's eye, and each slight to and fro shift of the instrument, as it carries the correcting glass nearer or farther from the eye, practically makes it a stronger or weaker lens, so that it no longer corrects properly the patient's refractive error.

EXAMINATION OF THE CORNEAL SURFACE.

The examination of the corneal surface by daylight often affords information better than can be obtained by oblique illumination. This is particularly the case when we are dealing with erosions, pittings, or irregularities of the corneal surface or with minute foreign bodies.

The best view of the corneal surface, I think, can be obtained as follows: The patient sits in a reclining or operating chair facing a window, with his head well supported and thrown somewhat back. The surgeon, standing behind him, examines the cornea with a strong loupe, at the same time playing light from the window on the surface of the cornea with a lens of about three inches focal length. By making slight shifting movements of loupe and illuminating lens, and making the patient move his eye bit by bit in different directions, and by carefully observing the change of shape of the reflex image of the window or circular image formed by the lens as the eye moves, we get an idea of the smoothness and regularity of the different portions of the corneal surface, and information as to the presence of any marked irregular astigmatism. We also determine the presence of any pittings or other sharp irregularities in the corneal surface, and by using fluorescein can tell whether there is the slightest defect in the epithelium.

Finally we can detect minute or faintly marked foreign bodies (rust remnants, etc.). (These are particularly well outlined by fluorescein which forms a halo of green about them.)

MAPPING OF SCOTOMATA.

We all have experienced difficulty in mapping scotomata—especially central scotomata and also enlargements of the blind spots—owing to the inability of the patient to maintain fixation. This difficulty may in a measure be obviated by one of the two following expedients, which I have found serviceable.

Double-Object Test for Scotomata.—Suppose that we are mapping out a scotoma or the blind spot on the tangent curtain, at 30 or at 60 inches, and have fixed in approximate fashion three or four points in the circumference of the blind area. We now take two objects, for instance two white hat pins, and placing them outside the blind area bring them together until both disappear. Then by separating the two objects, so as to carry first one then the other out of the blind area, we shall soon discover where they shall be so situated as to be both just simultaneously visible; *i. e.*, so situated as to occupy respectively the opposite ends of a diameter of the scotoma. By repeating this operation in several diameters we shall determine at least the size of the scotoma, if we do not determine its absolute position and shape.

An extension of the method enables us to determine the latter with reasonable accuracy. Having determined, say the horizontal diameter, we stick white pins in the extremities of the latter. We then determine the vertical diameter, making sure that as we do so the patient is aware of the simultaneous presence of both pins on the horizontal diameter. We now stick pins at either extremity of the vertical diameter. All four pins should now be visible simultaneously, and the slightest movement of the eye should extinguish one of them.

Two or more oblique diameters may then be filled in in a similar way and marked by pins at either end. Then the entire congeries of pins will outline the scotoma with quite reasonable accuracy.

Complementary-Color Test for Scotomata.—The following procedure enables us to plot a scotoma in one eye and at the same time keep that eye steady by utilizing the good central vision and good fixation of its fellow. Its use is mainly restricted to central scotomata.

The patient is placed opposite the tangent curtain or any dead black surface. The good eye, covered with a dark green glass, gazes fixedly at the white central pin of the curtain. The eye with the scotoma is left uncovered. A small deep red (cardinal red) disk placed on the end of a black rod is carried along the curtain from the periphery of the latter toward its center, along each meridian in succession. The red disk will be nearly or quite invisible to the good eye, because when seen through the green glass it will appear a dark brown—almost as dark as the curtain on which it moves. It will be visible to the other eye until it reaches the limits of the scotoma, when it will suddenly disappear.

What actually happens in applying the test is this. The patient, looking with both eyes, sees on the curtain a greenish pin, on which he fixes, and a moving red spot, which approaches the pin. Suddenly—as the disk enters the scotoma—the red spot turns to a very dull brown or becomes actually invisible. In either case, the change is very striking, so as to be readily noticed even by the unintelligent or unobservant. I have applied the test with success in a child with strabismic amblyopia, due to a small central scotoma, the presence of which I was not able to demonstrate by other methods.

The test can be even better made with a ruby glass and an emerald green test-object; and it can also be made with an amber glass and a dark spectral blue test-object.

In any case the limits of the scotoma are marked out in the usual way by pins stuck in the curtain.

FIBRO-ADENOMA OF THE CILIARY BODY.

By A. J. BRUECKEN M.D., Pittsburgh, Pa.

(From the Pathological Laboratories, University of Pittsburgh.)

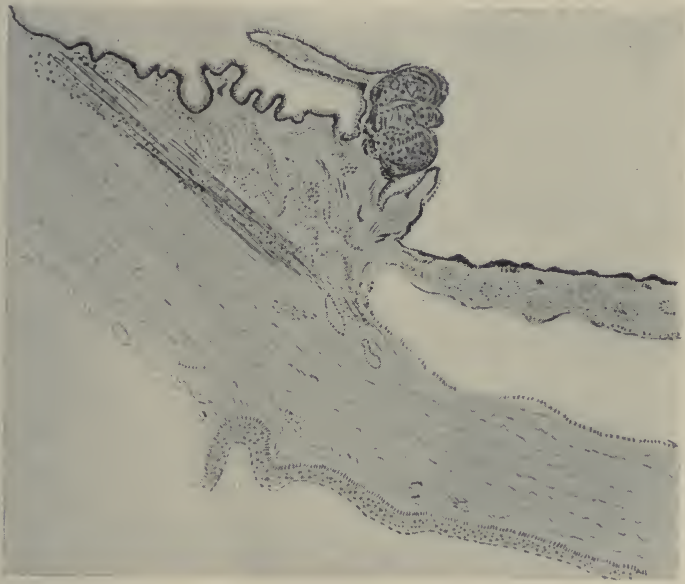
(*With one illustration on Text-Plate XIV.*)

DURING the routine microscopical examination of pathological specimens for diagnosis, a small tumor-like mass was found in the ciliary body of an eye which in the gross showed no evidence of its presence. The eye had been removed from a man of 63 years. The microscopic picture of the eye confirmed the macroscopic observations, save that the small new growth could not be detected by the naked eye. The materials were referred to me by Dr. Klotz for further study.

The history of the case was as follows: The patient worked all his life in a steel mill, and occasionally had pieces of flying steel get into his eyes. These were removed and he noticed no after-results. There was no history of conjunctivitis except at the time the foreign bodies were present. Six years ago the patient noticed a small white enlargement of the skin at the inner canthus of the left eye. This increased rapidly in size. After several months the mass was burned away by a physician. Three months later the inner canthus became inflamed and progressively worse. About eight months ago he had another operation performed, but the incision did not heal. Then he developed a sloughing cavity on the left side of the nose, apparently involving the eye. The eye was removed by enucleation. No tissue from this growth was received in the laboratory.

The eyeball externally was of normal size and appearance, but quite flaccid. The cornea and iris showed no change. The pupil was contracted and measured *2mm* in diameter. After prolonged fixation in ten per cent. formalin the globe was opened. The chambers and their contents

ILLUSTRATING DR. BRUECKEN'S ARTICLE ON "FIBRO-ADENOMA OF THE CILIARY BODY."



Fibro-Adenoma of Ciliary Body.

> appeared normal. The crystalline lens was in situ, but fell away on the slightest manipulation of the eyeball. It measured 1*cm* in diameter and 0.4*cm* in thickness. Its consistency was very firm and on section the central portion was very hard. The iris, retina, choroid, and sclera showed nothing of special note and the ciliary body was well developed. No evidence of a nodule was seen in the ciliary body.
>
> Microscopically there was seen in the anterior portion of the ciliary body, situated in the apical part of the ciliary process, a small irregular round or oval tumor mass, not over 0.75*mm* in diameter, staining purplish with hæmatoxylin-eosin. There was a remote resemblance to an intracanalicular fibro-adenoma of the breast, but aside from this it appeared quite unique. The ciliary plications were well marked, though there was no evidence on cross-section of the so-called "gland lumina," the recesses between the ciliary folds within the inner fibrous layer of the ciliary body and running in an equatorial direction.

The tumor mass occupied a position in the ciliary body directly opposite the equator of the lens and only one large ciliary elevation or fold intervened between it and the root of the iris. Unlike the tumor-like masses described by Alt, this mass was embedded in the surface of the fibrous layer of the ciliary body, forming a very low projection into the interior of the eyeball. Here on its inner surface it presented an appearance of having been deprived of the covering of the pars ciliaris retinæ, and, as indicated above, it apparently bounded the canal of Petit externally. However, it showed along this surface a definite layer of epithelial cells which in the anterior part were intact, but in the posterior part were somewhat broken. This covering represented the inner unpigmented cells of the pars ciliaris retinæ, which elsewhere was well defined into its two layers, but had an abrupt ending of the outer pigmented epithelial layer at both ends of the tumor mass. It is possible that the projecting portion of the tumor was broken away, and what was taken for the unpigmented cell layer of the pars ciliaris retinæ may have been one of the many epithelial cell layers present in the tumor. This was supported by the fact that those pigment cells on its surface at the anterior end were isolated, ill-defined, and had their pigment dispersed. The inner fibrous layer of the ciliary body was of apparently normal thickness, but the ciliary muscle fibers were abundant and the circular fibers of Müller were well represented. The connective tissue in some of the plications, like that of the tumor, stained quite deeply and appeared dense and hyaline in character. Elsewhere the connective tissue of the plications was finely fibrillated and showed relatively large and thin-walled blood-vessels. There was no change in the neighborhood of the tumor mass where, it may be noted, the blood-vessels were fairly numerous. About the circulus major, which was represented by two vessels, one behind the other, there was a large number of mononuclear leucocytes. Numerous lamellar and pigmented connective-tissue cells were present throughout, but were particularly abundant in the anterior portion of the ciliary body.

The tumor mass itself consisted of a sharply defined body made up of aggregations of epithelial cells embedded in an abundant homogeneous, vacuolated, and quite acellular substance which stained uniformly pale blue with hæmatoxylin-eosin and in all respects resembled the denser connective tissue noted in some of the ciliary folds. With higher power one could make out a fine fibrillation of this substance which was similar to the tissue of the ciliary folds. This substance, therefore, which represented a type of connective tissue, constituted by far the greater part of the mass.

Alt described four tumors which were similar to the above case. He refers to the stroma as a "coagulated amorphous substance" and found some compressed and flattened cells in the tumor appearing like spindles of connective tissue or myxomatous cells. It was difficult in some instances to differentiate the connective-tissue nuclei from the epithelial-cell nuclei. The connective-tissue cell nuclei were either very irregular or elongated and of large size, but not as large as those of the epithelial cells. Sometimes the connective-tissue cell nuclei were distinctly nodular in appearance; nevertheless, all these forms were also noted in the connective tissue of the ciliary body generally.

With van Gieson's stain the stroma was less conspicuous on account of the brownish color of the epithelial protoplasm which was found to occupy a larger portion of the tumor mass than was supposed. Thorough search for blood-vessels in the stroma showed their entire absence, although there were a fair number in the surrounding tissue. The epithelial cells showed large deep blue-staining oval, round, or polygonal nuclei with very poorly defined cell bodies. The protoplasm was of a clear homogeneous nature and showed no evidence of pigment granules except the marginal cells of the tumor mass. The latter formed a single almost continuous flattened epithelial layer on the inner surface of the rounded cup-shaped impression of the fibrous layer of the ciliary body in which the tumor resided, and it was this layer which so clearly demarcated the mass from the latter. At one place, however, this was not so, and here there was seen an inward extension of connective tissue from the fibrous layer of the ciliary body, which appeared to represent a plication with the usual covering, as is seen on the inner aspect of the ciliary body and a direct continuity between it and the connective-tissue stroma of the mass. Under low power, on account of this sharply defined limiting pigmented cell membrane, the appearance was not unlike an invagination and proliferation of the unpigmented cells of the pars ciliaris retinæ. The surrounding ciliary connective tissue immediately adjoining the tumor growth showed no change or relation to the tumor mass other than that mentioned. The protoplasm of the epithelial cells in the new formation seemed to merge insensibly into the surrounding tumor stroma even when stained by van Gieson's, in which it differed from the epithelium of the ciliary body. The arrangement of the epithelial cells was quite diverse: only a few formed tubules, while most were arranged in single or double layers which did not appear like glandular structures. The cells were often distorted, and the general haphazard disposition of all of the epithelial elements indicated a rather passive nature on their part, with no evidence of a proliferative response. Nevertheless, there was in most instances a more or less well defined contour and continuity of the epithelial cells, and in view of the receding character of the new formation with the excess of fibrous tissue there seemed to be little doubt that the tumor mass represented an epithelial inclusion with but little growth of the epithelial elements. The process may represent a primarily loosened and folded membrane of the pars ciliaris retinæ as Alt suggested, but in the present state the mass mainly consists of a fibrous-tissue increase. However, it is also possible that the fibrous-tissue increase of the folds was primary and the inclusion of the epithelial cells in the mass of hyaline connective tissue was only an associated condition.

In the absence of definite landmarks, such as gland lumina and cell membranes, one could not determine the exact position of the nucleus within each cell, but at the margins of the mass the nuclei appeared to be placed centrally. The nuclei, although they stained deeply, were not pyknotic and mitotic figures were not observed.

A section through the nodule at a different level showed the stroma more deeply stained with a well-marked reticulated structure, while the epithelial cells were decidedly darker. In this section, which showed several indentations in the margin resembling infoldings of the epithelium, there was also an abundance of stroma. The indentations in the margins may represent spaces between the adjoining infolding membrane of the pars ciliaris retinæ, as already suggested. The peculiar nature of the connective tissue of the fibrous layer of the ciliary body, as observed by Dr. Klotz, not only in this case but in inflammatory conditions such as glaucoma, is noteworthy. Notwithstanding the fact that the fibrous layer of the ciliary body is normally quite thick, there appears to be, in these instances, a definite increase and hyaline transformation of the stroma.

In his article on "Intraocular Epithelial New-Formations," Alt considers several possible explanations for such tumor masses, namely: hyperplasia of the palisade cells of the pars ciliaris retinæ, analogous to hyperplasia of cells in the pigment epithelium of the iris, ciliary body, and choroid; their relation to carcinoma, described by previous writers; their possible inflammatory character; their relation to Treacher Collins's so-called "glands of the ciliary body"; and, as above mentioned, the possibility of the development of the process in the loosened and folded membrane of the pars ciliaris retinæ. He speaks of hyperplasia of the pigmented cells of the pars ciliaris retinæ during plastic cystitis as follows: "The whole layer appears very much thickened and grows into the cyclitic membrane in an irregular way. We, however, also observe frequently a more typical kind of proliferation of the cells of the uveal layer in the shape of cylindrical tubes which grow into the cyclitic membrane and give off branches. In longitudinal and transverse sections these tubes appear like the glandulæ tubulosæ or the epithelial cylinders of an epithelioma. The cells of these tubes are either free of pigment or pigmented. Their shape and arrangement with their branches have given some authors (Schiess-Gemuseus) the idea that they are blood-vessels whose walls are filled with pigment."

As can be seen from the description of our tumor mass none of the above would appear to apply to it, for it showed no association with a cyclitic membrane, was not pigmented, showed sharp localization, presented no definite tubular arrangement of its epithelial cells, and lastly, the absence of blood-vessels, or any suggestion of these, was one of its prominent features.

But Alt does describe in this, and more fully in a previous article, a number of new-formations which from his illustrations and descriptions appear very similar to the one we have found. They differ in their location in the ciliary process and in the extent of their projection into the interior of the eyeball, but are alike in the involvement of but one ciliary process, the localized and segregated nature, the absence of pigment, the nature of the epithelial cells and stroma, and in the absence of blood-vessels. Interesting too, the period of life in which they are found is the same. The first four examples that Alt describes were observed in both eyes of a man who died from pneumonia, an eye removed for sarcoma of the conjunctiva, and an eye affected with panophthalmitis. In none of the cases had there been any symptoms or signs referable to the neoplasms, and their finding was wholly accidental, as was our specimen. Naturally this was due to their small size; still Alt's masses were larger than ours.

Alt called these tumors adenoma of the ciliary body in view of their gland-like tubular structure, but he tries to make clear that he does not necessarily believe the ciliary "pegs" to be true glands as Treacher Collins claims.

Previous to Alt, similar tumors were described by Pergens, Badal and Lagrange, and Michel under different names as "adenoma," "primary carcinoma," and "mixed endothelial and epithelial carcinoma" of ciliary body respectively, while Hanke described another such tumor under the name of "an epithelial tumor of the ciliary body." He mentions some such masses as "primary melanotic tumor," "primary melanotic glandular carcinoma," "primary epithelial tumor of the ciliary body," "glioma of the pars ciliaris retinæ," and other names given by various authors. He concludes that there can no longer be any doubt that epithelial new-formations are found to spring from the two epithelial layers of the ciliary body and processes and in rare cases from the pigment epithelium of the choroid as well as the iris.

Unfortunately, because of the small size of the nodule precluding the possibility of obtaining any further sections, and on account of the fixation in formalin, any further special stains for the stroma in our case could not be made.

The tumor mass was too compact and too deeply placed to represent retraction of the anterior layer of the suspensor ligament of the lens with inclusions of the pars ciliaris retinæ. There was obviously some proliferation of the epithelial cells, as the surface area represented by them was much greater than normal. In the absence of any evidence of cyclitis or cyclitic membrane one must recognize the neoplastic nature of the mass. The relation to a fibromyxomatous tumor in view of the repeated slight traumatism of foreign bodies would be interesting, but one could make out no definite evidence of a true myxomatous change of the fibrous tissue though in part its reactions were such.

Could it be that the growth represented an overgrowth of epithelium with the development of a very dense stroma in some of the ciliary folds? That is, could it not be that these new-formations represented simple papillomatous growths with no other etiology than irritation? It is possible that, through excessive efforts to accommodate in hyperopic eyes, with elasticity of the lens lessened, the pars ciliaris retinæ becomes greatly folded, and in places where there is unequal muscular contraction may even become firmly compressed, with consequent hyperplasia of the cells of the area involved. This view is supported by the early and progressive hyperopia in the history of our case. On the other hand, it may be that the injury from numerous foreign bodies, of which the patient speaks, points to traumatism as a possible factor.

What we have attempted to emphasize is the importance of the stroma in our case pointing to a passive character on the part of the epithelial structure.

THE PROTECTION OF THE NORMAL CRYSTALLINE LENS AGAINST THE HARMFUL EFFECT OF ULTRA-VIOLET LIGHT.

By Dr. W. E. BURGE, Nela Research Laboratory,

and Dr. A. J. NEILL, Physiological Laboratory of the University of Illinois.

(*With one illustration in the text.*)

THE first series of experiments described in this paper were carried out to determine whether opacity of the lens or cataract could be produced in excised pig and ox lenses by radiant energy.

I.

EFFECT OF INFRA-RED AND RED.

Sir William Crookes[1] concludes that glass-blower's cataract is due to the long waves of the spectrum. This conclusion was based on the fact that he found the radiation from molten glass in the glass-blower's furnace to be rich in red and infra-red. In the following experiments an electric furnace operating at about 1000° C. was used as its radiation is rich in red and infra-red.

Lenses fitted into floats made of thin rings of cork were almost submerged in open-mouthed vessels containing egg-white and blood serum, respectively. The vessels were placed in a tank of running water with their mouths slightly above the surface of the water. The electric furnace was inverted and placed directly over the lenses at a distance of 15*cm*. The preparations were exposed, in some instances for as much as one hundred hours, without the production of an opacity either in the lens or in the media. Other experiments were carried out similar to these except that the furnace was placed 5*cm* from the surface of the lenses. Under these conditions the lenses could be rendered opaque in about ten minutes. On placing a thermometer on a lens thus rendered opaque it was found that the temperature in the region of the lens was about 80° C.

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[1] Crookes: *Philosophical Transactions*, Royal Society of London, 1914, A–500.

EFFECT OF VISIBLE SPECTRUM.

Lenses were arranged on floats similar to those described above and almost completely immersed in egg-white and blood serum. By means of a bi-convex glass lens four inches in diameter and with a principal focal distance of approximately twelve inches, the filament of a nitrogen-filled tungsten lamp operating at 2000 cp. was focused on the lenses. In no case was opacity of the lens produced. Similar experiments were performed by focusing the image of the sun on the lenses. Opacity could be produced in a very few minutes, but in every case it was found that the temperature of the lens was raised sufficiently high to coagulate its protein.

The conclusion may be drawn that opacity of the lens cannot be produced by radiation from the region of the infra-red or of the visible spectrum provided the temperature effect be excluded.

EFFECT OF ULTRA-VIOLET.

Lenses were introduced into quartz tubes previously filled with egg-white and blood serum, respectively. The diameter of these quartz tubes was slightly less than the diameter of the lenses, so that each tube was filled in a horizontal direction by means of the immersed lens. The tubes were closed with rubber stoppers and placed horizontally in a tank of running water at a depth of 1*cm* beneath the surface of the water and 5*cm* below a Cooper Hewitt quartz mercury-vapor burner operating at about 2500 cp. The egg-white and the blood serum were firm coagula after twenty hours' exposure. The immersed lenses were, however, as transparent as at the beginning of the experiment. The experiments were continued for one hundred hours and at the end of this time there was practically no change in the transparency of the lenses.

Dryer and Hanssen[1] and others have found that practically all the proteins and related substances are either coagulated or changed in some manner by exposure to ultra-violet radiation. The lens protein seems to be an exception in that it is not coagulated. The lens possesses the property, fluorescence, by means of which it absorbs the shorter waves and radiates this absorbed energy in the form of longer waves. A provisional hypothesis is advanced that in this manner the lens disposes of more or less of the energy of the short waves and thus protects its protein from coagulation.

The above experiments would seem to show that it is practically impossible to produce an opacity of the lens or cataract by means of radiant energy from the infra-red, the visible or the ultra-violet regions of the spectrum, under conditions much more extreme than any to which the human eye is ever subjected, and hence it seems evident that there must be some factor involved in the production of cataract other than radiant energy. Analyses[2] of several thousand cataractous lenses both from the United States and from India show that there is a great increase over the normal in the amounts of certain salts. The percentage of potassium in the ash is greatly reduced, while the percentages of calcium, magnesium, and sodium are greatly increased over the amounts existing in the normal lens. In cataractous lenses obtained from the United States there was no indication of silicate, while those from India contained distinct amounts of the silicates of potassium, calcium, and possibly of sodium. This increase in calcium, magnesium, sodium, and silicon found in the cataractous lenses suggested that their presence might make possible the coagulation of the lens protein by radiant energy, even though under normal conditions radiant energy has no effect on the protein. To test this hypothesis the following series of experiments were performed, using the same apparatus as before, but with $m/100$ calcium chloride, $m/100$ magnesium chloride, and $m/100$ sodium silicate as media for the lenses. Since cataract is found as a complication of diabetes

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[1] Dreyer and Hanssen: *Comptes rendus*, cxlv., 234, 1907.

[2] Burge: These ARCHIVES, xxxviii., No. 5, 447, 1909.

m/100 dextrose was also used as a medium. These solutions of themselves did not affect the transparency of the lenses after more than one hundred hours of immersion.

II.

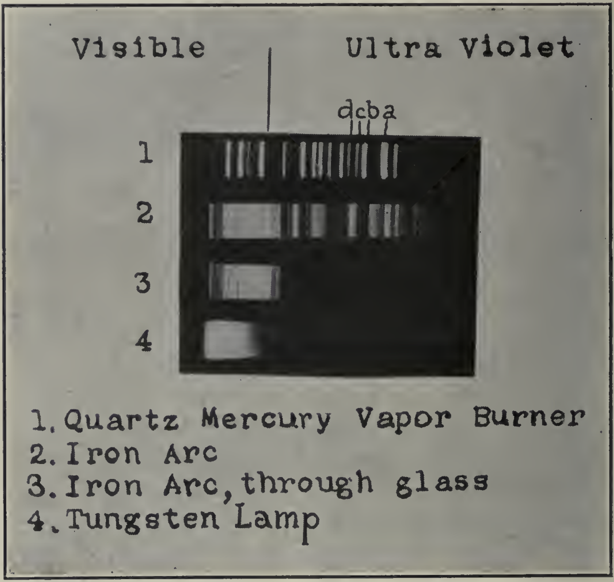
EFFECT OF INFRA-RED AND VISIBLE SPECTRUM ON LENSES IN SALT SOLUTIONS.

Lenses were immersed for two hours in *m*/100 calcium chloride, *m*/100 magnesium chloride, *m*/100 sodium silicate, and *m*/100 dextrose, respectively. They were then exposed to the radiation from the electric furnace, the tungsten nitrogen-filled lamp, and the sun. Exposures were made as in the preceding experiments without affecting the transparency of the lenses or of the media, provided the effect due to rise in temperature was excluded.

EFFECT OF ULTRA-VIOLET ON LENSES IN SALT SOLUTIONS.

Similarly quartz tubes containing similar media and immersed lenses were prepared, and after two hours were exposed to the radiation from the quartz mercury-vapor lamp. It was found that the solution in the quartz tube containing a lens immersed in *m*/100 calcium chloride became turbid after twenty-five minutes' exposure. The portion of the lens on the side next to the burner had become an opaque mass after seventy-two hours, whereas the transparency of the half of the lens away from the burner was only slightly affected. The same thing happened on the exposure of a lens immersed in *m*/100 magnesium chloride, in *m*/100 sodium silicate, and in *m*/100 dextrose, except that the effect was not so marked and was not produced so quickly as when calcium chloride was used.

Experiments were carried out using the Fuess quartz spectograph in order to determine which wave-lengths emitted by the quartz mercury-vapor arc caused the coagulation of the modified lens protein. Five lenses were placed in a .25% solution of calcium chloride for two hours. At the end of this time the clear liquid was poured off and introduced into a quartz cell. This cell was made of two quartz disks



1. Quartz Mercury Vapor Burner
2. Iron Arc
3. Iron Arc, through glass
4. Tungsten Lamp

4*cm* in diameter and 1.2*mm* thick. These disks were separated by a ring of hard rubber 0.8*mm* thick with an inside diameter of 3.8*cm*. By means of the spectograph the spectrum from an 800 cp. quartz mercury-vapor lamp was focused on the solution. At the end of fifteen hours a delicate white band of coagulated lens protein could be seen. This band was found to correspond to three fused bands in the spectrum of the ultra-violet, of wave lengths 265.2μμ, 265.3μμ, and 265.5μμ ("a," Fig. 1). At the end of twenty-four hours' exposure two more delicate white bands of coagulated lens protein were to be seen. These two bands corresponded in position to two bands in the spectrum of the ultra-violet, of wave lengths 289.3μμ and 296.3μμ, marked "b" and "c" in the photograph. In the region of 302.1μμ there was an ill-defined hazy precipitation of lens protein. From these results it would appear that the effective region in producing coagulation of the modified lens protein is between 265μμ and 302μμ and that the most effective region is around 265μμ.

The conclusion may be drawn that the lens protein, which normally cannot be coagulated by ultra-violet radiation, can be so modified by those substances found to be greatly increased in cataractous lenses that ultra-violet radiation can coagulate it and hence produce an opacity of the lens. This conclusion refers specifically to the chlorides of calcium, magnesium, and sodium, to sodium silicate, and to dextrose which is found in increased amounts in the body fluids of diabetics.

It was found that these same substances which modify the lens protein so that the short wave-lengths can coagulate it also decrease the fluorescence of the lens. This would seem to suggest that there may be some relation between the fluorescing property of the lens and its ability to resist the coagulative effect of ultra-violet radiation.

Henri[1] and others[2] have shown that bacteria are very quickly killed by exposure to ultra-violet. The following experiments were carried out to determine if fluorescing bacteria are more resistant to the action of ultra-violet than the non-fluorescing.

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[1] Henri, Helbrommer, and de Recklinghausen: *Compt. rend. de l'Acad. des Sciences*, 1910, v. 150, p. 932.

[2] Stassano and Lematte: *Ibid.*, 1911, v. 152, p. 623.

III.

EFFECT OF ULTRA-VIOLET ON FLUORESCING AND NON-FLUORESCING BACTERIA.

The method of procedure for each kind of bacteria was as follows: A solution of .9 % sodium chloride containing the bacteria to be exposed to ultra violet was filtered through a fine-grained filter. Two cubic centimeters of the perfectly clear filtrate were introduced into each of ten quartz tubes of a capacity of approximately 9*cc*. These tubes were placed 30*cm* from a Cooper Hewitt quartz mercury-vapor lamp operating at 2400 cp. At the end of twenty-second intervals a tube was removed. In this manner solutions were obtained which had been exposed to ultra-violet 20, 40, 60, 80, 100, 120, 140, 160, 180, and 200 seconds, respectively. Each solution was plated and the number of bacteria counted, according to ordinary bacteriological methods, at the end of forty-eight hours' incubation.

The results of the experiments are given in the tables on the following pages.

It may be seen from the tables that of the seven different kinds of non-fluorescing bacteria none were alive after an exposure of two hundred seconds, while of the eight different types of fluorescing bacteria none of the cultures were completely destroyed after an exposure for the same length of time.

CONCLUSIONS.

1. Cataract or opacity of excised pig and ox lenses cannot be produced by means of radiant energy from the infra-red, the visible, or the ultra-violet regions of the spectrum, under conditions much more extreme than any to which the human eye is ever subjected, provided the heat effect be excluded.

2. The lens protein can be so modified by weak solutions of the salts that are found in cataractous lenses and by dextrose that ultra-violet radiation can produce coagulation and hence opacity of the lens or cataract.

TABLE I.

NON-FLUORESCING BACTERIA.

Time of Exposure	Number of B. subtilis	Number of B. mucosus capsulatus	Number of B. proteus vulgaris	Number of B. violaceus	Number of Micrococcus capsulatus	Number of B. coli communis	Number of Sarcina aurantiaca
0 Sec.	13,000,000	24,000,000	295,000,000	27,000,000	28,000,000	29,000,000	195,000,000
20 "	—	—	—	—	—	—	—
40 "	—	—	—	—	—	—	—
60 "	13	460	2480	83	171	378	4820
80 "	7	112	79	60	4	9	60
100 "	7	107	71	20	2	1	10
120 "	6	8	4	5	2	0	2
140 "	4	6	2	4	1	0	1
160 "	2	5	2	0	0	0	1
180 "	1	0	1	0	0	0	0
200 "	0	0	0	0	0	0	0

NOTE: It was not deemed necessary to count the bacteria after the 20 and 40 seconds' exposures, hence the numbers of bacteria for these periods are not given in the tables.

3. The same substances which modify the lens protein so that ultra-violet radiation can produce opacity also decrease the fluorescence of the lens.

4. Fluorescent bacteria are more resistant to the action of ultra-violet radiation than non-fluorescing.

5. A provisional hypothesis is advanced that the great resistance exhibited by the lens and by fluorescing bacteria

TABLE II.

FLUORESCING BACTERIA.

Time of Exposure	Number of Bacteria A	Number of Bacteria B	Number of Bacteria C	Number of Bacteria D	Number of Bacteria E	Number of Bacteria F	Number of Bacteria G	Number of B. pyocyaneus
0 Sec.	72,000,000	80,000,000	28,000,000	70,000,000	75,000,000	33,000,000	25,000,000	79,000,000
20 "	—	—	—	—	—	—	—	—
40 "	—	—	—	—	—	—	—	—
60 "	750	813	55	210	460	12	361	88
80 "	459	623	29	79	211	10	112	20
100 "	223	221	25	56	113	7	18	14
120 "	129	102	20	29	103	5	8	12
140 "	97	88	15	18	56	4	6	8
160 "	81	73	12	13	38	3	6	2
180 "	43	29	10	6	25	3	5	1
200 "	31	15	3	3	11	2	4	1

NOTE: It was not deemed necessary to count the bacteria after the 20 and 40 seconds' exposures, hence the numbers of bacteria for these periods are not given in the tables.

to the action of ultra-violet may be due to this power of fluorescing. The assumption is that the lens and fluorescing bacteria by converting the absorbed short waves into longer waves get rid of more or less of the energy which otherwise would have been spent in coagulating their protein.

SOME UNUSUAL CHANGES IN THE VISUAL FIELDS.

THE RESULT OF VASCULAR LESIONS IN THE BRAIN AND OPTIC NERVES.[1]

By WILLIAM CAMPBELL POSEY, M.D., PHILADELPHIA.

(*With 10 illustrations in the text.*)

CASE 1.—*Permanent quadrant and hemianopic losses following so-called "migrainous attacks."*

Five weeks ago, I was asked to examine the eyes of a woman, aged 46, with a visual disturbance of several days' standing. It was stated that the patient had always enjoyed the best of health until the present attack, which she ascribed to the effects of a late supper of beer and Welsh rabbit, becoming overheated from dancing, and a cold ride home in a taxicab. The morning after these indiscretions, she awoke with a dull headache and blurred vision, and, thinking herself bilious, took calomel and castor oil, without, however, procuring any abatement in her symptoms, the headache, which was chiefly centered over the right eye, and the loss of sight, which seemed to be confined to the same eye, still persisting. It was at this juncture that my advice was sought and an ophthalmic examination instituted. It needed but the most cursory test to determine that her visual defect depended on a right lateral homonymous hemianopsia, though this was resolved by perimetric test into a quadrant defect merely, the lower portion of both temporal halves being normal (Fig. 1). The fixation points and the nasal fields were also uninvolved. There were no accompanying sensory or motor disturbances, and cerebration was clear. The examination of the urine was negative. Corrected vision was normal in each eye and there were no changes in the extraocular or intraocular muscles. Both fundi were normal, save for marked signs of vascular sclerosis, the walls of both retinal arteries and veins being thickened and the vessels themselves unduly tortuous. In close association with the right inferior retinal artery, there was a small vascular new-formation, one-fourth the size of the disk, which either marked the site of a previous hemorrhage or depended on an aneurysmal dilatation of the artery. The patient was confined to her bed with a low diet and quiet enjoined. It was elicited that although she had been in the habit of taking several cocktails daily and keeping late hours, her health had been of the best. She had never suffered previously from migraine or any form of head pain. After a week or more of absolute rest and liquid diet, alteratives were prescribed and more freedom in her movements tolerated. There was no recurrence of the head pain, but the loss in the field of vision still persisted. This may be ascribed, in all likelihood, to definite changes produced in the visual cells of the left cuneus, in consequence of an interference with their function from intestinal toxæmia, either from hemorrhage or by reason of the formation of a thrombosis in the terminal artery supplying them, or as a result of prolonged spasm of the walls of the vessel.

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[1] Read by invitation before the Section on Ophthalmology and Otology of the Baltimore City Medical Society, Feb. 17, 1915.

A careful search through the literature revealed a number of somewhat analogous cases. Of these, Hun's[1] is the most instructive. In this instance a homonymous loss in the lower left quadrant of each eye was found at necropsy to have been occasioned by an atrophy of the lower half of the right cuneus (Figs. 2 and 3). This case occurred in a man, aged 57 years, of extremely nervous temperament. The visual affection came on during an attack of vertigo and mental confusion, after several premonitory spells of a somewhat similar nature. Death occurred two years later from angina.

From an inspection of the plates in Seguin's article which represent the cortical lesions which have been found in cases of hemianopsia, Hun was forced to the conclusion that the fibers from the right upper quadrant of each retina have their final termination in the lower half of the right cuneus, and the fibers from the right lower quadrant of each retina terminate in the adjacent part of the right median occipito-temporal convolution. Of course the same relationship holds good between the left half of each retina and the left cuneus and left median occipito-temporal convolution.

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[1] Hun: *Am. Jour. Med. Sc.*, January, 1887.

Spiller[1] quotes a case of quadrant anopsia, reported by Beevor and Collier,[2] with necropsy and careful microscopic study, which is exceedingly valuable in determining the location of the cortical lesion causing quadrant anopsia. The only symptom of nervous disease was blindness of the left upper quadrants of both visual fields, the fixation point escaping. This condition remained constant nearly two years. Necropsy showed that an occlusive lesion of the right posterior calcarine artery had caused destruction of the cortex (1) of the right fusiform lobe for its posterior two centimeters, (2) of the right lingual lobe from the junction of the calcarine and parieto-occipital fissures to the pole of the hemisphere, (3) of the whole cortex in the depth of the calcarine fissure, (4) of the greater part of the inferior cuneal gyrus, small areas only at the anterior and posterior limits of this gyrus being free. The necrosis did not involve the optic radiations at any point. The only parts of the cortex of the mesial aspect of the occipital lobe which had escaped destruction were the upper two-thirds of the cuneus and the anterior and ventral portion of the fusiform gyrus. As the lower quadrants of the visual fields were entirely uninvolved, the left upper quad-

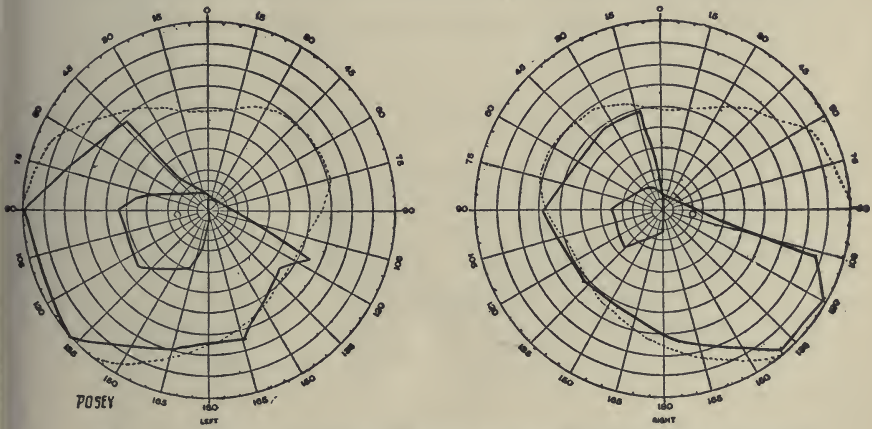

FIG. 1.—Loss of homonymous right upper quadrants, still persisting five weeks after a mild attack of auto-intoxication with headache.

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[1] Spiller: *The Eye and Nervous System.*

[2] Beevor and Collier: *Brain*, 1904.

rants alone being affected, it would appear from this case at least that the cortex of the upper two-thirds of the cuneus is the visual center for the lower quadrants.

The cortex lining the calcarine fissure was completely necrotic. Beevor and Collier think, therefore, that the primary half-vision center cannot be limited to the calcarine cortex, nor the macula be exclusively represented in the anterior portion of this region. Spiller is of the opinion that the consideration of this case modifies the sharp distinctions made by Henschen in the relation of the upper and lower fields to the calcarine fissure, for the necropsy would seem to indicate that the lower part of the retina appears to be represented in the upper lip of the calcarine fissure.

In 1894, Weymann[1] described a case in which the defects in the visual fields consisted of homonymous quadrant losses in the upper left field, and similar defects in the lower right field of each eye (Fig. 4). The loss in vision in this instance occurred in a syphilitic adult male, and dated from an attack of unconsciousness followed by right hemiplegia. Later speech became thick and unintelligible, and the mentality seemed at times entirely suspended. There was incontinence

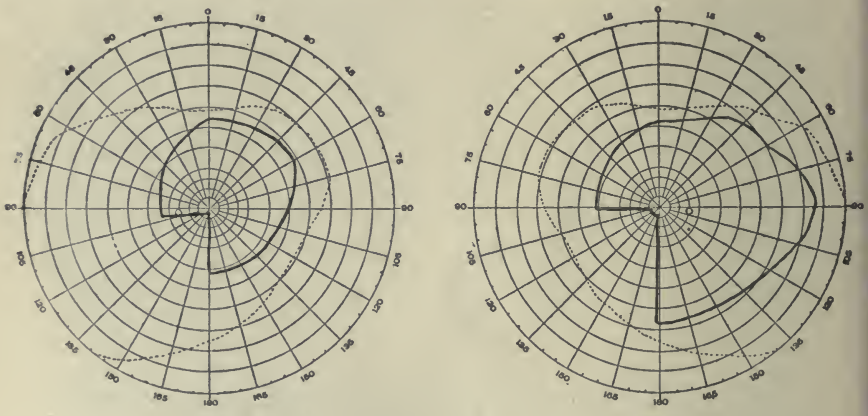
LEFT
RIGHT

FIG. 2.—Loss of homonymous left lower quadrant, subsequent necropsy showing area of softening in cuneus (from Hun, *American Journal of the Medical Sciences*, January, 1887).

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[1] Weymann: *Am. Jour. Ophth.*, October, 1894.

of feces and urine. Mixed treatment brought about a marked improvement in all the symptoms, enabling the patient to resume his occupation of dancing master. The defects in the visual fields, however, remained unchanged. Weymann thought them to be dependent on a lesion in each cuneus.

In another case of left quadrant hemianopsia, reported by Gowers, in which the loss in the field was complete for color, but partial only for form, there was associated left hemiplegia. Necropsy showed each cuneus to be normal, but a patch of softening was found in the right internal capsule. Gowers suggests that a partial lesion may have temporarily damaged the whole half-vision center, or possibly injury to the optic radiations may have cleared up partially, leaving the fibers of one section destroyed.

Homonymous quadrant defects in the visual fields are of rather rare occurrence from any condition, and, as far as I am able to discover, these few cases just quoted are the only instances which occur in the literature which are at all similar to the case I have described.

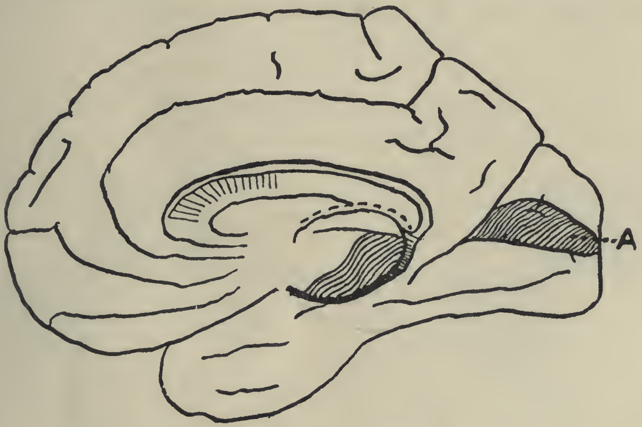

FIG. 3.—Median aspect of right hemisphere; *A*, cuneus, point of attack (from Hun, *American Journal of the Medical Sciences*, January, 1887).

More often the visual loss consists in a full hemianopic defect, as exemplified by the following:

CASE 2.—In May of last year, Mrs. F. W. B., aged 33 years, was referred to me by Dr. C. H. Frazier, on account of a loss in the right field of vision. This had followed an attack of severe pain in the left side of the head, accompanied by loss in sensation and motion of the right arm and leg. Sensation returned in the paralyzed side about two hours after the attack, and motion some time later, but the visual defect persisted. Following the attack she stated she experienced from time to time a peculiar kind of headache, which she described as a creeping sensation, which began in the occiput and slowly extended to the vertex. Two months prior to the examination, during a spell of severe localized pain in the right side of the head, she thought that there had been a partial return of sight in the outer part of the right field of vision. She ascribed her head symptoms to typhoid fever, which was followed by a post-typhoid infection of the gall-bladder. A number of gallstones had been removed by operation, but a fistula remained which demanded a second operation for its healing. The examination of the eyes was negative, save for the changes in the fields, which consisted, as may be seen by the accompanying charts (Fig. 5), of right homonymous hemianopsia. Though complete in the left eye, the hemianopic area in the right eye was incomplete, for in the extreme temporal periphery a small island of uninvolved field area could be distinctly mapped out with a 10*mm* white object. A second perimetric test made two months later gave similar findings. In a recent letter, the patient stated

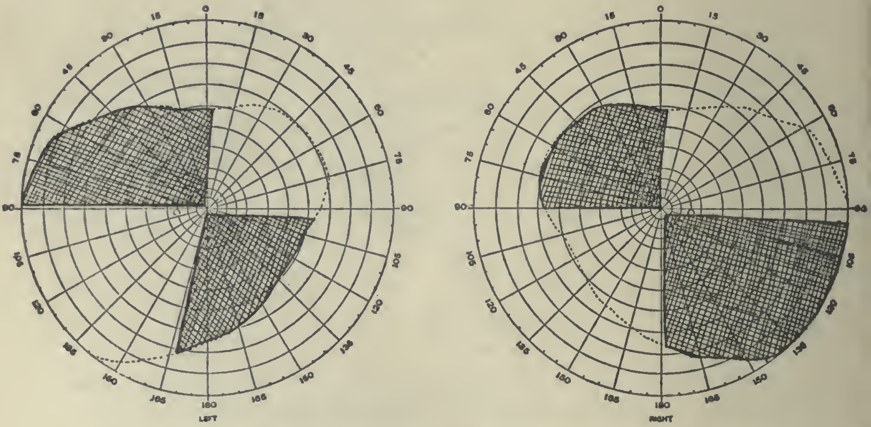

FIG. 4.—A case of quadrisectoral hemianopsia. Probable lesion in each cuneus (from Weymann, *American Journal of Ophthalmology*, October, 1894).

that her general physical condition had improved. There had been no return of the head pain, but she was unable to note an improvement in her sight. She writes: "The spot of sight in the right eye (the uninvolved area in the periphery) is slightly larger, but the big shadow is spreading left toward the center of the eye." The case was regarded by Dr. Frazier and Dr. Spiller, who was also seen in consultation, as one of migraine with persistence of the hemianopic defects in the field. Dr. Spiller located the lesion near the left internal capsule, implicating the optic radiations and interfering temporarily with the sensory and motor fibers in the internal capsule, probably by vascular disturbance and resulting congestion. The possibility of thrombosis must, however, also be considered.

To this case a number from the literature may be added, and as some of these came to necropsy, considerable light is thrown on the sublying pathologic lesion causing the hemianopsia.

Of these, the case most referred to is that of Hoeflmayer, who noted the persistence of hemianopsia for a month in a woman aged 57, who had frequent attacks of migraine for forty years. The hemianopsia appeared after a prolonged attack, in which the patient lay in a stuporous state for ten days. The hemianopsia cleared gradually, at first the outline

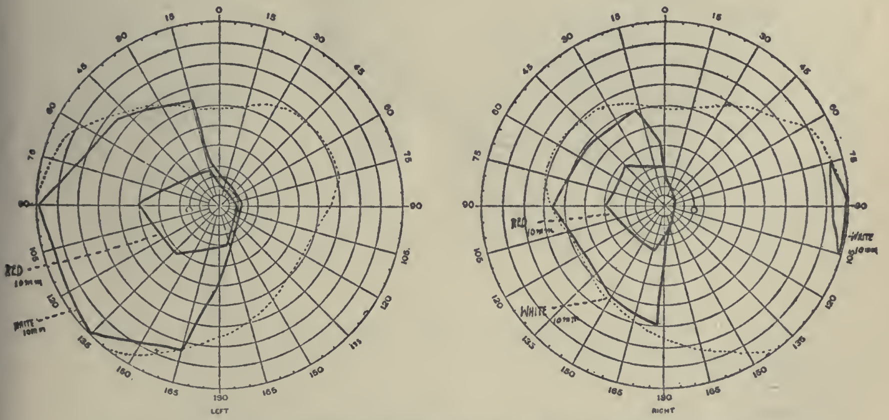

FIG. 5.—Right homonymous hemianopsia with preservation of a small area in extreme periphery of right field, persisting sixteen months after an attack of migraine. Right eye: Lesion near left internal capsule implicating optic radiations, etc.

of objects being seen dimly and then more and more clearly, until normal fields of vision supervened. Hoeflmayer thought the condition a toxic one, added to a neurasthenic exhaustion.

Févé's case of a woman aged 34, of permanent hemianopsia with preceding evanescent attacks of vertigo and hemiplegia, was doubtless due to organic cerebral disease; also Charcot's, of a patient who a year before, in consequence of an attack of hereditary migraine with temporary aphasia, was left with hemianopsia, which did not disappear. Migraine attacks of less severity continued at longer intervals.

In Noyes's case, that of a man aged 52, severe attacks of migraine with vomiting had occurred frequently during ten years. Finally, in a sharp attack, after violent vomiting, typical left lateral hemianopsia followed, with a concentric limitation of the nasal half of the field of the left eye. Death occurred three years later from cerebral hemorrhage. A clot was found in the right cuneus.

In a case of ophthalmic migraine seen by Huguenin, with hemianopsia and aphasia, an obliteration of the artery of the fossa of Sylvius was found at the necropsy. To these may be added three additional cases by Thomas of Boston. The first one seemed, from the history, the absence of heredity and the nature of the attack itself, to have been due to arterial disease,

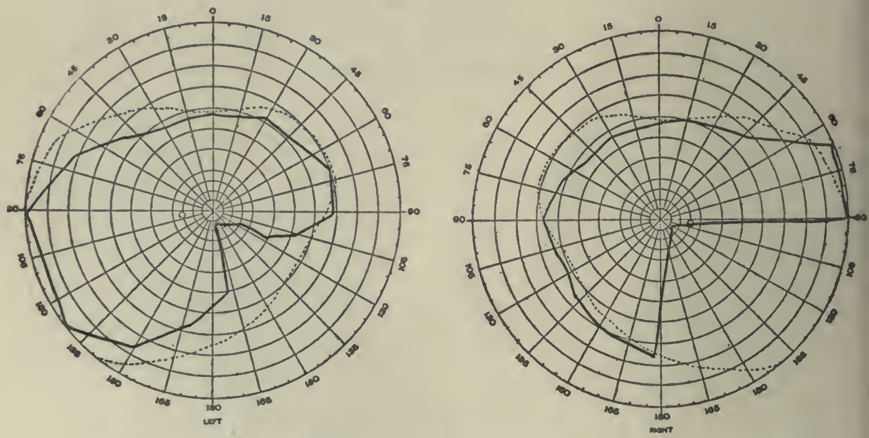

FIG. 6.—Fields taken during a migrainous attack. Right inferior temporal quadrant loss.

and it is probable that the migraine attack was no more than an exciting cause for the vascular lesion, and possibly only a symptomatic migraine. Thomas thought the second, and particularly the third case, to be clear instances of cerebral softening ascribable to attacks of migraine. In the second case the presence of sugar in the urine was only temporary, it being absent in two later examinations, and present only at the first test, so that it was probably symptomatic only. In neither case was there any evidence of kidney, heart, or arterial disease, or of syphilis.

As appears from the foregoing, there is ample evidence in the literature that migraine may be the exciting cause of organic brain disease, and that an area of softening of the brain may follow, which may manifest itself by a permanent paralysis, aphasia or hemianopsia. While such lesions usually occur in individuals who are predisposed in consequence of disease of the walls of the blood-vessels, it would seem that in certain cases the vascular lesion may occur in young persons and even in some adults with healthy vessels. Caution, however, must be observed in ascribing even an exciting rôle to migraine in cases of organic brain disease, as it is not unlikely that independent disease of the blood-vessels is respon-

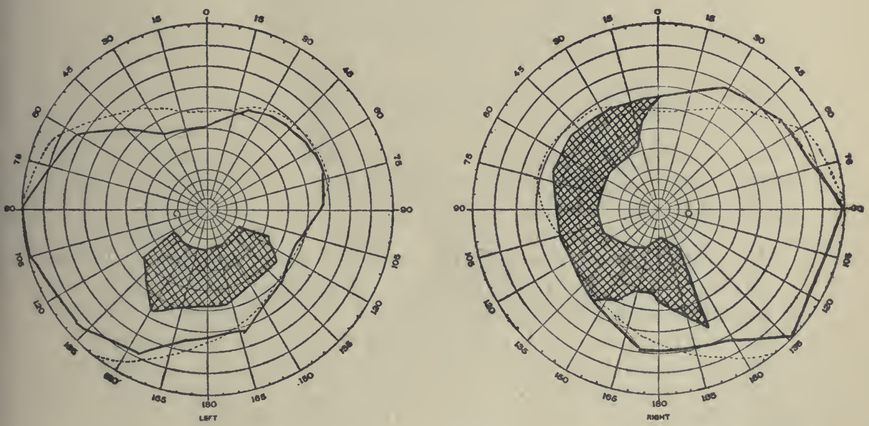

FIG. 7.—Fields taken during a migrainous attack. Scotoma is now hemianopic in type in the right eye, and is on the nasal side. In the left eye the scotoma occupies the lower field.

sible for the resultant symptoms, and the migraine merely coincident.

Finally, before closing the subject of migraine, I will cite the history of a case which is of interest on account of the presence of a hallucination in the blind area, and also because of the fact that I had the opportunity of obtaining careful fields at the height of an attack.

CASE 3.—This case occurred early in my professional career, about twenty years ago, and was described in a paper entitled "Visual Perceptions as Symptoms of Disease."

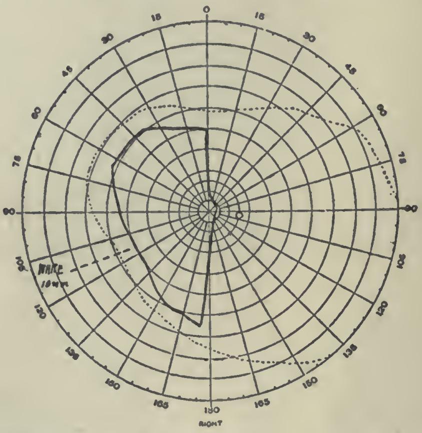

FIG. 8.—Left eye blind from thrombosis of the central artery of the retina. Temporal field of right eye lost from central apoplexy, right nasal field alone remaining.

An abbreviated account of the case is as follows: After a number of ordinary migrainous attacks, the patient, a neurotic woman aged 30, suffered one rather more severe, in which she saw a large blue eye the size of a bull's in the dark area of the field of vision. The eye was in rapid motion and was projected to the right on her blind side and was visible even with closed eyes. Its appearance was succeeded by an intense throbbing pain in the left temporal region. Synchronously she had a sense of numbness in her right side from the shoulder down. After persisting a few minutes, the eye would disappear, but would reappear about every twenty minutes. The fields, which were taken at a period when the scotoma was present, showed a partial right inferior temporal quadrant loss (Fig. 6).

A few days later she returned with another attack, when a second perimetric study was made. These assumed a different type from those first made, the defect being now on the left side (Fig. 7 A). It was only when the headache was most intense that the scotoma was positive, for at other times objects could be seen in it, although with changed appearance. For example, the white quadrant of the perimeter would often appear bisected, or, again, one corner would be cut off; again, it would seem very minute, and at times it would be lost altogether. Colors were not perceived in the area of the scotoma. Directly after this field was secured, the right eye was bandaged, and the field of the left eye studied. Here the scotoma was directly below, and presented the same characteristics as that of the fellow eye. When the scotoma left the field, it could always be reproduced by testing the field in that position. On the tendency which the scotoma had to shift about being remarked, the field of the right eye was taken once more, as shown in Figure 7 B. The scotoma was now in the inferior portion of the field, and corresponded to that which was observed in the left eye. It is interesting to note the rapidity with which the scotoma shifted itself about. Although taken very carefully, the fields were rapidly obtained by the McHardy perimeter, so that not more than half an hour was consumed in obtaining the two. When the tests were being made, the patient was perfectly calm and collected, and there were no manifestations of vasomotor changes in the face. At no time did the scotoma involve the fixation point. It was curious to note the way in which the patient

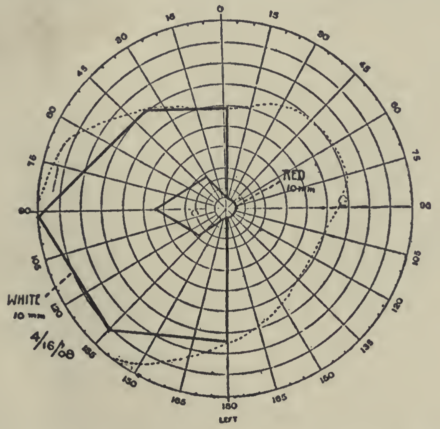

Fig. 9.—Monolateral nasal hemianopsia of left eye from pressure atrophy in consequence of atheroma of the vessels of the optic nerve (?).

described the object when viewed in the affected area. At times it would appear glistening white and rapidly fade out of sight, and then again it would have the peculiar distorted outlines just referred to. At times the white object would appear red, again blue, and then a variety of colors.

CASE 4.—*Left eye blind from thrombosis of central artery of the retina. Temporal field of right eye lost from cerebral apoplexy, right nasal field alone remaining.*

I have had under my care for many years an old lady, now 90 years of age, who typifies to a marked degree the consequences which extreme vascular disease may have on the eyes. Ten years ago, the sight of the left eye was suddenly lost from stoppage of the central artery of the retina. As there had been pronounced changes in the retinal vessels for years, the interruption of the blood current was thought to be due to thrombosis, though the premonitory, transient attacks of blindness which usually accompany that condition were absent. Although seen a few days after the loss of sight had supervened, there were no changes discernible in the fundus, with the exception of a marked diminution in the size of the blood-vessels. Several years later she suffered a right hemiplegia, with a loss of the temporal field of the right eye, leaving her with but the nasal half (Fig. 8). This field is becoming more and more restricted from an atrophic condition of the nerve, which is apparently due to local arterial sclerosis.

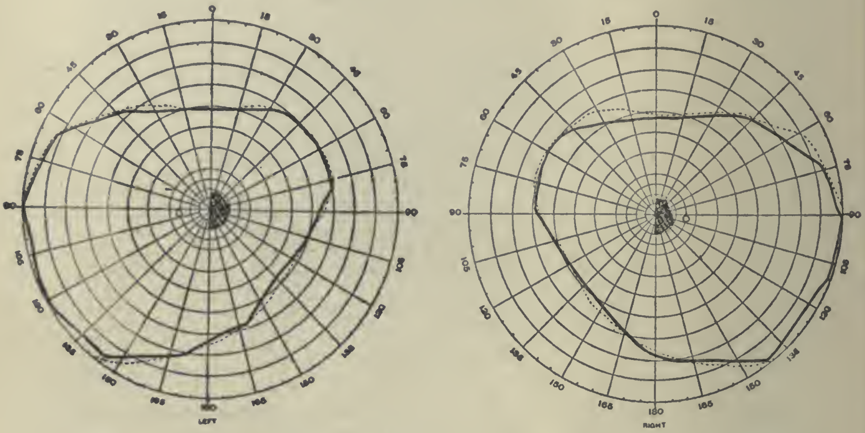

FIG. 10.—Right homonymous hemianopsia in the macular regions from blocking of an end artery in or near the cortical center of the visual area.

CASE 5.—*Unilateral optic atrophy and contralateral hemiplegia consequent on occlusion of the cerebral vessels.*

Under this title, Cadwalader of Philadelphia described a case of a man aged 35 in whom there was associated nearly complete motor aphasia, marked weakness of the right side of the face, cerebral in type, with spastic paralysis of the right arm and leg. Vision of the right eye was normal, but the left eye was totally blind. The right optic nerve was gray, but in the left eye there was optic atrophy with a reduction of the arteries to mere threads. Cadwalader thought the symptoms could be explained by necropsies performed on similar cases of Batten and Guthrie, of Jackson and of Gowers, in which an embolic mass was found to have been carried through the internal carotid artery into the middle cerebral vessel, producing apoplexy and hemiplegia, while a portion of the clot was swept into the ophthalmic artery. as it branched from the internal carotid. It was thought that in some instances the clot might lodge in the central artery of the retina itself, producing sudden blindness and atrophy.

CASE 6.—*Monolateral nasal hemianopsia of the left eye from pressure atrophy in consequence of atheroma of the ophthalmic artery* (*?*).

Ophthalmologists have devoted considerable attention to the effect exerted on the optic nerve by a sclerosis of the vessels in association with it. The late C. S. Bull and Zentmayer, in our own country, have referred to it in comparatively recent monographs. Perhaps the first comprehensive paper on the subject, however, was by Otto in 1893, who "described cases of circumscribed atrophy of the optic nerve caused by a sclerosis of the internal carotid and ophthalmic arteries, which induced dilatation of the breadth of these vessels in places, hardening of their walls, and pressure on the optic nerve by mechanical means. Sections of the optic nerve showed the effects of pressure by the enlarged carotid and ophthalmic arteries on the optic nerve behind the foramen, in the form of flattening and incurvation of the nerve as a whole, and flattening of the central nerve-fiber bundles and circumscribed atrophy of the central and marginal nerve-fiber bundles." Otto also traced out both ascending and descending atrophy of the nerve fibers in these cases. He affirmed that the flattening of the central nerve-fiber bundles on both sides, distal and proximal, of the atrophic zone, corresponding to the pressure of the enlarged vessels, is always present.

In 1902, Liebrecht studied seven cases from an anatomical standpoint and attempted a classification of the three sites at which pressure on the nerve would be most likely to occur. Lack of time forbids further consideration of this subject. Bull's conclusions may, however, be cited: "Wherever the location of the pressure, the resulting atrophy of the nerve is at first a pure pressure atrophy, which is propagated downward and forward toward the disk, and upward and backward toward the chiasm. Later in the course of the disease, there is probably added a secondary proliferation of connective tissue between the nerve-fiber bundles, which induces a more extensive atrophy and perhaps the development of new vessels. The atrophic zone at first extends but a short distance from the zone of pressure. Where it actually reaches the disk, we must assume the existence of a secondary complicating atrophy in the optic nerve, the result of connective-tissue proliferation."

An example of probable pressure atrophy of the optic nerve from sclerosis of one of the larger vessels in association with the nerve, more likely the ophthalmic artery, is the case of Mrs. T., now in the nineties, who first consulted me about fifteen years ago, on account of loss of vision in the left eye. This had come on, she thought, rather suddenly several months before. As shown by the accompanying field (Fig. 9), the visual defect was found to consist in a complete nasal hemianopsia, with preservation of fixation. The nerve was pale, bluish-white, and avascular, and the retinal vessels much diminished in size. Corrected vision equaled $\frac{5}{12}$. The right eye was normal, save for signs of pronounced arteriosclerosis, both in the nerve and retinal vessels. There was no limitation of the field of vision. This case has been under more or less constant observation ever since and the fields have remained unchanged, the hemianopic field still persisting, and no other limitation being remarked in the remaining field of the left eye, or in that of the right. Central vision still remains as at the first examination.

CASE 7.—*Right homonymous hemianopsia confined to the macular regions from blocking of an end artery in or near the cortical center of the visual area.*

> A rare lesion in the fields is that of a hemianopic defect confined to the macular regions. I have seen but one case of this kind, which I have already reported elsewhere.[1] This occurred in a man aged 56, a sufferer from rheumatoid arthritis for many years, whose disturbance in vision occurred in association with some dizziness and confusion of mind and speech. These symptoms cleared away after several days, and the only resultant disability seemed to be in reading from type, distant sight appearing normal. A careful functional examination of the eyes showed them to be normal in all respects save for a loss of vision in the macular region of both eyes, as per fields (Fig. 10). Corrected distant vision was normal. This condition persisted until the death of the patient a year later from apoplexy.

This defect in the visual fields in association with cerebral disease was called attention to by Mills, in 1898, in his textbook on Nervous Diseases, although Wilbrand, in 1907, in a paper entitled "The Macular Hemianopic Disturbance of Reading and von Monakow's Projection of the Visual Sphere," in which he reported eight cases observed by him, was the first to give a detailed analysis of the condition. As pointed out by him, central vision is normal, the scotomas which are negative and very small and paracentral, being generally unobserved in distant vision. Great difficulty, however, is experienced in reading, especially of fine print. For in the act of reading, as Wilbrand points out, the finest details of the letters must be recognized. Thus, in ordinary reading, the initial letter of the first line is fixed directly, the rest of the word and perhaps the word following being seen by indirect vision. As soon as this impression is received, the eyes spring to the right and another initial letter is fixed directly and what follows to the right indirectly. When the end of the line is reached the eyes make a longer jump to the left, beginning a new line below. Movements to the right are fewer when the subject is able to comprehend more words in anticipating the sense of the text. When in macular hemianopsia the scotomas lie to the right, there is difficulty in indirect vision, and every syllable of each word must be painfully fixed; when, on the other hand, the scotomas lie on the left of fixation, there is great difficulty in finding the commencement of each line.

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[1] Posey, W. C.: May, *Ophth. Rec.*,1908.

When the letters are small, short words and letters disappear entirely.

As Wilbrand points out, it is not difficult to confuse the uncertainty and hesitation which subjects of this condition have in reading with dyslexia and alexia, this being particularly the case when the scotomas reach the fixation points, so that in all suspected cases, a rough test of the field of vision is insufficient and careful search should be made for scotoma by sufficiently small test objects.

Wilbrand is of the opinion that the scotomas under consideration appear when an end artery in or near the cortical center of the visual area becomes blocked up, and believes that the calcarine artery, which runs in a deep fissure on the medial side of the occipital lobe, supplying the largest and most important of the visual radiations, is the vessel chiefly implicated.

In two of his cases the probability of emboli was rendered likely by the presence of mitral and aortic insufficiency. In other cases circumscribed, septic encephalitis, and syphilitic disease of the vessels with thrombosis were possible causal factors. In another case the cause of the hemianopsia appeared more direct, for in this instance a small iron screw, which projected about 13*mm* above the level of its support, penetrated a woman's skull in the region of the left visual center. When the thickness of the scalp and skull was considered, but a very shallow penetration of the skull cavity was possible.

VISION: ITS ECONOMIC VALUE AND CONSERVATION.[1]

BY LLOYD B. WHITHAM, M.D.,

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CONSERVATION! How often, of late years, have we heard the word! Conservation of natural resources, forest lands, mineral deposits, animal or vegetable wealth, and what not! Is it but natural, then, that, at a time when public-spirited men and profound thinkers, the world over, are struggling with vast economic problems of physical, commercial, social, and scientific interest, when the tax rates and cost of living are steadily ascending, when the labor question has become so pertinent and vital, that the minds of medical men, social workers, economists, and the like should be drawn into the current of thought, started, twenty-seven years ago, by Woods, Howe, and others, now, through practical application, grown into a mighty river of conviction? I refer to the researches into the subject of preventable blindness, the economic statistics evolved, and the rapid strides in prophylactic legislation and public education which have been made in the past few years.

Following its first exploitation, the subject received little attention for a number of years, but, after a while, the American Medical Association took the matter up, and appointed a committee which collected some classical data on blindness, and made a study of the immediate causes and underlying conditions. Later the Russell Sage Foundation was organized and started its magnificent work, now known and applauded the world over. This foundation finances the fight against preventable blindness, conducts scientific investigations by salaried and expert social workers, distributes instructive literature, and helps to promote, in whatever manner possible, knowledge where needed. Through the medium of this foundation professional men, social servitors, philanthropists, altruists, and a most representative coterie of citizens have united in a common cause and are working side-by-side, shoulder-to-shoulder, in what promises to be the most successful propaganda of public education which has ever been instituted in this country.

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[1] Read at the meeting of the Howard County Medical Society, April 6, 1915, at Ellicott City, Md.

And, when we pause to reflect, what is the conserving of timber tracts, coal lands, and so forth, when compared with the God-given treasure, Vision, which, in a large measure, makes possible man's greatest achievements and discoveries! However, I am not here to dwell, in a humanitarian way, upon the pathetic side of blindness (a state to which many of those afflicted prefer death), but to discourse, in a business-like manner, upon its baleful influences in a thriving, civilized community, the tremendous monetary waste involved, the loss of good citizens and their possible achievements, the moral effect of bad management, poor legislative and medical protection, and a score of such inter-related considerations, and to review what is so well known to and so little regarded by some of us: our civic obligations, not only as taxpayers and voters, but as physicians, responsible for the health of the people. We cannot lightly pass this subject by, dry and uninteresting as it may be, who are, in so large a measure, either actively or, what is perhaps worse, passively to blame for the remediable conditions bringing about this very state of affairs.

There has been no particular effort made by medical journals, aside from that of the American Medical Association and the ARCHIVES OF OPHTHALMOLOGY, to keep the profession informed as to the progress of the Conservation of Vision Movement in various parts of the country and in the world at large. It is doubtful whether more than a few in our profession, barring those who have made a study of the problem, are conversant with the work that has been done in the past, with the present status of the movement, and with the various plans for the future evolved in different communities. It is hoped that, some day, there will be an acknowledged central organization, which will keep in touch with the work done in various states, and will publish, from time to time, useful information as it accumulates, "each commonwealth having its own peculiar problems, climatic, hygienic, and legislative, to deal with."

Economically, the conservation of vision can be rated almost as high as the conservation of life, from some standpoints higher, for, when dead, a man imposes no burden of upkeep upon the public, his widow can re-marry and be supported, together with her children, by another obliging man, so that affairs naturally readjust themselves. Not so with the blind, for that pitiful, useless human machine, though he may learn to make brooms, weave baskets, and so forth, must, to his dying day, be housed, clothed, fed, and, in not a few instances, those dependent upon him as well, in view of the miserable status, until this year, of compensation for those blinded by industrial accidents in the United States. Where we read or hear of one blind person who is self-supporting, the lists show scores who are wellnigh useless as far as earning capacity is concerned. How many Miltons, how many Gores, how many Kellers has the world seen? Assume that Pasteur, Lister, or Koch had been born blind! Think you that we should ever have heard of them? Without the lamp Vision, the garrets of their brains would forever have remained unexplored and musty! But enough of this digression. Let us return to cold, remorseless facts. To what extent has this economic aspect of the situation been investigated and what authentic data have accumulated?

In the first place, what do we mean when we speak of blindness? Of course it is technically defined as "incurable, total loss of sight." The popular definition of it, however, is "that condition in which the sight is so diminished that any occupation requiring the use of the eyes is impracticable."

It costs about $15,000,000 to support the 300,000 blind dependents in the United States! This does not include privately supported blind persons, nor enter into the potential loss in work, achievements, etc., which will be considered later.

The Maryland appropriation was $45,000 for the School for the Blind, which educates 200 children, and $10,000 for the Workshop for the Blind, or a total appropriation of $55,000. For the latter, for the next two years, an additional $5000 has been decided upon, which will bring the total up to $60,000 a year. For each one in the school $350 is allowed, whereas for the adults $150 is the least amount. This is a mere trifle! The biennial appropriation of Pennsylvania was $265,000, and New York's yearly grant was $110,000. Of course these amounts are not a fair estimate of the cost, as private gifts, bequests, and so forth are not included.

The board and clothing, however, are the smallest items in this interesting investigation. As these people are non-producers we must add what they would have contributed toward the national wealth had they been able to work. Twenty-three years ago Woods spoke upon this very subject. At that time, estimating the wages of a man at $1.20 a day, and a woman at 40 cents a day, he found in 1887 a loss of $25,000,000. Since that time the value of labor has increased with the multiplication of our industries and our constantly increasing export trade, so that this estimate would be far too low for the present monetary loss to the nation. In fact, when we realize that the exercise of practically all the trades or professions open to man depends, almost absolutely, upon good eyesight, the economic factor becomes more than evident, it becomes appalling!

In estimating the expenditure of the commonwealth's moneys we must not overlook another appropriation, the public schools. One is astonished when shown, as Wessels has done his readers, the cost of the education of children with defective vision who, because their efficiency is impaired by poor eyesight, stay in the same class for two, three, or more years. In Philadelphia, under normal conditions, a pupil of fourteen years reaches the eighth grade at a cost to the State of $280. If the child with defective vision reaches only the fourth grade in that time, it has cost the State $280 with $140 worth of result, a loss to the State of $140 for each backward child. Of 7319 cases, examined by Wessels in four years, 72% were backward, representing a composite loss in money of $414,685 for those children alone. New York City has 650,000 public school children, 30% of whom are two years behind in their natural grades! Reflect upon the total waste from this state of affairs! But the child's loss is greater, for he is likely to be put to work at that age, 14 years, poorly equipped for the struggle of existence, his earning power curtailed for the want of an education, so that he can contribute but little toward his family's support or toward the State which again loses, loses money, loses a valuable worker or thinker, loses a useful citizen and, perhaps, gains a rogue to support, because of neglect of eye examination and proper treatment at the receptive, moldable age in the child's life. As Allport puts it: "To such children school work is a pain and a burden. They are always behind their classes, sometimes remaining in one room year after year, an exasperation to their teachers and discouragement to themselves. Unless relieved and rendered fit for study, they are regarded as mentally deficient and morally vicious, become personally disheartened and truant, drift into bad society and associations, commit small and then greater crimes, and eventually may enter the criminal classes, and then become an expense and care to the commonwealth as police court defendants, and as dwellers in asylums, institutions, and prisons." Surely, "education is the greatest enemy to crime!"

So it will be seen that our statistics as to the appropriations for blind asylums do not cover the expense, and that we can count some of that appropriated for hospitals, prisons, houses of correction and sundry asylums, simply because some eye condition, neglected during the formative age, has indirectly driven a number of the inmates there as State charges, whereas, had they been started aright, the potential power of these outcasts would be incalculable.

One of the most vital elements in the economic question is presented by accidents, principally industrial. It requires no very vivid imagination to picture the workman, after years of apprenticeship, expert in some one particular line, invaluable to his employers, supporting a large family, endeavoring to educate his children and give us even better citizens, suddenly rendered blind by a perfectly preventable accident, made practically useless for life, earning capacity rendered nil, expert ability gone forever!

But, when one eye only is injured, one might think that the man could do his work just as well, provided the other eye retained its vision and sympathetic ophthalmia did not develop. Not so, unfortunately, for, although the total visual power may be normal, the special advantages possessed by binocular vision—to wit: the binocular field of vision and the binocular perception of depth—are taken away, the loss of the latter depriving him of his stereoscopic sense, or the power to estimate dimensions of depth directly and with precision, thus rendering him unfit for work requiring a definite and certain appreciation of distances, a power necessary in practically all of the higher crafts, and in a great many of the lower forms of occupation as well. In fact, some employers, merely on general principles, refuse to engage a one-eyed man. Although he may have normal vision in the remaining eye, the earning capacity of the individual is cut down 33% or more, even though he be so successful as to secure employment.

We cannot consider accidents resulting in blindness without taking account of the indemnity or compensation for the same. As there have been, until recently, no good compensation laws here, we shall refer to the German, although the Austrian are equally good. In the former country, the expenses of the treatment are borne from the beginning of the fourteenth week, and an income furnished the injured workman for the period of his incapacity to work. This income is $66\frac{2}{3}\%$ of the yearly wage for total disability. Think, then, of the thousands of dollars wasted annually in compensation for preventable accidents, in loss of the skilled workers, in loss to the workers of their salaries, to the families of their educations, their creature comforts, if not their livelihood, the loss to the nation of the potentially prosperous citizens and taxpayers, and so on, indefinitely, around the vicious cycle. Truly Gladstone knew whereof he spoke when he remarked: "In the health of the people lies the wealth of the nation."

So much for the economic side of the question! And now let us consider the commoner causes of preventable blindness, and briefly review what is being done and what is being left undone in the war against this "carcinoma of the country," as one medical writer has aptly styled it.

Although the work carried on in the past has shown its results in a slight decrease in the number of the blind, there are still 7500 persons yearly becoming blind in the United States, and 2000 of these are due to absolutely preventable causes, of which Ophthalmia Neonatorum heads the list.

Yes, 40% of the blindness of the world is due to this scourge! In discussing a bill providing for the care and education of the blind, recently brought into the British House of Commons, the observation was brought forth that there were in England, alone, 5000 blind persons whose misfortune was due to lack of attention at birth. A committee, appointed by the British Medical Association, has reported that one-third of the inmates in the Blind School of Great Britain have Ophthalmia Neonatorum to blame for their condition. Dumas, among 1178 blind cases, found 69% due to Ophthalmia Neonatorum. In some States the statistics are not pleasant reading, especially for us "of the cloth": in the Maryland School for the Blind the percentage from this disease has averaged 30, and in 1910 this State's percentage was 28, of which three-fourths were born under the care of midwives, and one-fourth under physicians' care. Mortifying, indeed, is the conclusion that such a percentage of preventable infantile blindness can be laid at the door of physicians. We can expect such things of the ignorant set of women who, for the most part, represent midwifery in this State, but our physicians!—the thought pains me deeply as it must every one of you. There are, in all communities, of course, some medical outcasts, men who cannot be reached, who would not, if reached, be capable of understanding the ethics of their responsibility in this matter. If I thought that there was such a man in this audience I should not speak so candidly. With you it is not worth our time to argue as to the value of this silver-nitrate prophylaxis which Créde gave us in 1881, for we are, I am sure, in accord as to its efficacy, so absolutely established by the statistics of Créde, Felsenrich, Bayer, Konigstein, and a score of others, upon thousands of comparative cases, with and without the instillations. The matter was decided, for all who follow medicine's progress, before I was born!

And with this simple means at our hands, why do babies still go blind from Ophthalmia? The answer is as clear as day: Because of the ignorance of parents, and the negligence of physicians or midwives. We can expect nothing of the parents until public instruction in the cause, effects, and prevention of Gonorrhœa has been carried directly into the households by the social workers (still a young profession but the right arm of medicine). We can expect next to nothing from the prevailing low caste of women, now practicing as midwives, until the State sees fit to impose some qualifications to demonstrate mentality or adequate experience, as is customary in a number of communities. But the Doctors of Medicine!

The work done in regard to the prevention of Ophthalmia Neonatorum is the most interesting, perhaps, of all the conservation work, and certainly merits the most attention. First, contemplating the subject from the legal standpoint:

The first legislative steps to control the disease in the United States were taken by Maine in 1891, Maryland being sixth in line with her law which, though amended not long ago, is still inadequate, as will be seen by comparison with those of New York, Pennsylvania, North Dakota, Utah, Kansas, Oregon, and others. Perhaps the most ideal law is the one which passed the Kentucky Senate a year ago. It is based upon the model bill recommended by the American Medical Association, which requires that not only midwives and physicians but nurses, hospitals, etc., must immediately report all cases in which the symptoms of Ophthalmia Neonatorum appear within thirty days after birth. This obviates the weak point in the otherwise good bills of a great many States, namely the failure to make the reporting immediate, some allowing several days' grace, in which time, we all know, the damage to sight may be irreparable from ulceration of the cornea and possible expulsion of the lens. Time will not be taken to dwell upon the laws of other countries except to say that they are, on the whole, superior to ours. The instillation of the 1% silver-nitrate solution should be enforced and failure to do so punishable by law. In New York, last year, $5000 was appropriated by the State, through legislative grant, for the free distribution, throughout the State, of prophylactic outfits for the prevention of Ophthalmia in the newborn, consisting of sterilized dropper and bulb, vial of silver-nitrate solution, and circular containing instructions for administration. Massachusetts, New Jersey, Rhode Island, Vermont, and the District of Columbia have likewise adopted this procedure. In Indiana, North Dakota, Minnesota, New York, and Ohio, the birth certificate contains the following question: "What preventive for Ophthalmia Neonatorum did you use? If none, state the reason therefor.

Public instruction can and will accomplish a great deal. The Infirmary at Sheffield, England, distributes printed notices among the poor, via the social workers and physicians, telling of the danger of Ophthalmia, and warning them that they must consult a physician as soon as the eyes begin to matter, etc. It would be well to have the vaginal secretions of pregnant women routinely examined during the last month of pregnancy and necessary treatment instituted.

The importance of ocular hygiene in schools has, for the past few years, been generally recognized by school boards, the country over, although definite action to improve matters has, in a great many places, been deferred for various reasons. There being 20,000,000 public school children in the United States, of whom 5,000,000 suffer from eye diseases or defects, which seriously impair their school progress, if not their future worth, is it not rational that we taxpayers should insist upon the systematic examination of all school children's eyes, and correction of any existing faults obstructing their development into useful co-workers who can share our mutual burden in supporting the government appropriations? Such examination, testing of the vision of each child, employment of school nurses to look after school hygiene and instruct classes, and medical inspection of schools are now being successfully employed in a great many communities, noticeably those of New England. There are a number of places in which no child is admitted to the school until the eyes have been examined by some competent person and visual defects noted and corrected, if possible. I refer not only to the correction of ocular defects by glasses, although school children are most frequently retarded in their work by myopia, hypermetropia, astigmatism (the starting point of myopia), muscular weaknesses, etc., but to the conditions, not infrequently met with in the poorer, ill-nourished classes, namely: sore and red eyes, lid troubles, diseases of the lacrimal ducts, various forms of keratitis and corneal ulcerations, iritis, cataracts, and strabismus, all of which prevent good eye service, promoting, consequently, neglect of work, laziness, and truancy. As a matter of fact, separate classes for these extreme defectives should be instituted, as has already been done in New York and London, where the children, by the use of large letters, diagrams, etc., or by being read to aloud, are given the essentials, thus preserving their eyes which, otherwise, could not stand the strain of the regular curriculum, and would, upon the child's graduation, be worthless, as far as practical use is concerned. As some physicians have formed the pernicious habit of referring patients with eyestrain to the so-called "Optometrists," against the fundamental principles of visual conservation, I shall inject a word upon that subject here. Some one has well defined "Optometry" as the misguided effort, upon the part of an ignorant public, to elevate a crowd of tradespeople to the dignity of a profession. And that is just what is being done in some communities, I regret to say. These people are being entrusted with one of the most delicate and complicated special organs of the body, an end-organ of the brain, a structure sharing as intimately as the liver our systemic dyscrasias. Would you let a carpenter operate upon your mastoid simply because he handles a chisel with manual dexterity? It is about as logical for a physician who wants good results with his patient to refer a refraction case, a young person, to an optician, as it is for an opthalmologist to refer a case of syphilis to a druggist for examination and medical treatment. It is impossible, in young or middle-aged subjects, to measure correctly the refractive state of an eye in which an active ciliary body and crystalline lens, ever changing the focus, are present, and paralysis of the ciliary body must be induced.

School hygiene, however, goes farther, and demands that the schools have a good, open location, plenty of light (not intense, but coming from the left side of the schoolroom), that the ventilation be perfect, that the desks and seats be adjustable and fitted to each particular child, thereby obviating faulty postures with consequent distorted spines, tilted heads, etc. Since the introduction of these measures in the schools of our large cities there has been a steady fall in the percentage of myopic eyes, despite the swelling of the statistics by the prevalence of myopia in our foreign-born, Russians, Jews, Poles, and the like, who come direct from sweat-shops, badly illuminated and ill-ventilated rooms, with insufficient food and outrageous hygienic surroundings.

Accidents, industrial and otherwise, are accountable for some of our most pathetic cases of blindness, for they usually occur in those upon whom others are dependent, and who can least afford to be deprived of vision. Magnus gives the proportion of traumatic cases as 10% of all blindness, although it is being rapidly cut down by the introduction of protective devices for those employed in foundries, factories, and shops where particles of steel, iron, copper, etc., fly about. The large corporations, railroads, and similar industrial organizations, realizing the economic side of the question, are making a study of this feature, and workmen are urged to wear protecting glasses, dangerous machinery is being screened, and those with weak, diseased, or only one eye are not permitted to work where there is any undue exposure of the eyes, as by flying particles, etc. The introduction of antiseptic treatment for eye wounds, the training of the employes in the removal of foreign bodies from the lids or eyes, not by finger-nails, toothpicks, knife-blades, tongues, etc., but in a clean way, have been potent factors in the cutting down of this unnecessary blindness. The household and allied accidents causing blindness can be combated only by a slow process of education. The accidents from the previous insane celebration of the Fourth of July have been wonderfully decreased since the passage of ordinances by most of our large cities prohibiting the sale or ignition of fireworks within the city limits. Baltimore has such an ordinance although not, as yet, sufficiently enforced, I regret to say.

Trachoma, thank the propitious powers! has caused Maryland little concern, although it is endemic to an alarming extent in certain sections of some of our States, and among the Indians upon the reservations. Among all examined in five counties of Kentucky, it was found present in severe form in 12.5%, while 22.7% of our Indians are afflicted. At Ellis

Island, alone, 1100 cases are annually detected. We are all only too familiar with its ravages, visual damage being caused in 75% of untreated cases. This crisis has been and is being met with a firm hand by State and Federal authorities alike, the official exclusion of infected immigrants being universally approved. In Kentucky the so-called "Mountain Fund" is provided for the maintenance of traveling clinics, addresses are given, under the auspices of the State society, in court houses, before college classes, institutes, county schools, women's clubs, and church societies. Sections of medical students are taken into the mountains, for short periods of time, in order that they may have a practical knowledge of Trachoma when they become physicians. In the Indian reservations men of experience with Trachoma have been placed in the field and are doing excellent work in the prevention of the spread of the disease, although hampered by lack of funds and insufficient appropriations. The chronicity of Trachoma and its tendency to relapse makes its treatment a prolonged one, and it has been suggested that, in the case of children, hospital schools be established, similar to those so successfully operated by the London Charity School Boards, for the treatment of children with the disease. In these institutions children are detained long enough to insure the complete eradication of the trachomatous process, receiving, while inmates, some training in the elementary branches of education, so that, when discharged, they are "earning increments of the commonwealth, not sightless charges upon it." With adults, those upon whom others lean for support (males being more frequently affected), the most feasible plan appears to be in-treatment for a month or more, until the acute stage has passed and the secretion disappeared. When discharged, the social workers follow up the cases, see that the home treatment is properly attended to, and that the patients do not transmit the disease to others. In New York special Trachoma clinics have been established for the treatment of children in the public schools.

Blindness from insufficiently treated syphilis is a form of which we have to take cognizance. It is impossible to gain accurate statistics as to this variety, but, judging from those we see in the clinics, in which treatment had evidently been neglected, the proportion is tremendous. We all know how difficult it is to keep in touch with these patients, and how they drift away from us after a few days' treatment, but the sequels are so grave and there is so much involved, indirectly affecting ourselves, that we should make more of an effort to keep them in sight until the treatment is satisfactorily completed. It is well to bear in mind, in passing, that the spinal, intracranial, and intraocular sequels and complications of syphilis, resulting in blindness, in the great majority of cases, are seen in those whose treatment has not been completed, who have been allowed to abandon all treatment after a few months of mercury or an injection of salvarsan. Iritis, choroiditis, optic neuritis and atrophy, intracranial gummata, or spinal scleroses could, in most cases, be forestalled were the treatment carried through to the end. For this reason physicians are giving lists of procrastinating patients, and those who are neglecting their regular treatment, to the local social-service officers, knowing full well that they will send out indefatigable workers, and that the patients will be kept under observation and made to "toe the mark." Practically all of the large hospitals have their own social-service departments for the proper handling of these and similar cases, and the magnificent results secured at the Johns Hopkins Hospital, by the chief and her splendid corps of assistants, have been most encouraging. How gratifying it is to feel that all one's trouble spent in diagnosis and medical advice will not be wasted, and that the cases will be followed through and watched for the physician, the patients being visited in their homes, and the progress of the conditions, as well as the method of administering the medicines, noted. Thus the number of cases of neglected Interstitial Keratitis has been cut down, and many of the later ocular sequels of lues probably prevented.

A small proportion of blind cases are the result of neglect of simple eye lesions or mistaken diagnoses by poorly trained physicians, which is being met by the recent elevation of the standards in the larger medical schools, and the provision for ophthalmic wards in the general hospitals, arrangements thus being made for student instruction in practical ophthalmology.

We shall probably witness a great decline in the number of blind cases from the imbibition or absorption of wood alcohol, as New York is setting the example and conducting a vigorous State and city campaign, with the active coöperation of the Brewers' Association, aiming to eliminate the use of the methyl alcohol, unless labeled "Poison." Now its promiscuous use in the adulteration of cheap whiskey, and for many other purposes, is well known, while the notice of ophthalmologists has long been attracted to a class of cases of blindness in those who shellac pencils, furniture, etc., in ill-ventilated quarters, for which reason employers have been urged to provide suitable, roomy shops, for their workers, assuring, thereby, plenty of fresh, circulating air. This toxic blindness, a disease of the optic nerve, can be caused by excess of whiskey, tobacco, lead, and several less known poisons. The first two we have learned to recognize early, with the use of the perimeter and ophthalmoscope, while the latter has been reduced wonderfully, as has general lead poisoning, by the preventive measures so familiar to us, and instituted in all important white lead works, namely: washing of hands before eating, sulphuric acid lemonade, etc.

We must still consider poor or improper illumination as the primary cause of a great deal of practical blindness. The relation of lighting to the conservation of vision has been scientifically investigated by the committee, and, in New York, with the hearty support of the Illuminating Engineering Society, the lighting of public places, churches, theatres, assembly rooms, offices, and the like, has been revolutionized, diffusion has been secured and glare has been eliminated, thereby forestalling the lenticular and retinal changes found to accompany the prolonged use of the eyes in direct, bright, glaring light.

There are several more minor subjects, of a kindred nature, which I might take up with you, but I feel that I have, already, imposed upon your patience and good nature, and, having presented the more vital items for your consideration, I am satisfied.

Of course, in the final analysis, the prevention of blindness will depend upon public instruction; for the people, through the medium of the social worker, will realize the dangers of mistreated gonorrhœa or syphilis; they will, then, know what to expect of their midwives or physicians, and the latter will have to live up to what is expected of them; they will become acquainted with hygiene in its broadest sense, will shun the common roller-towel as they do the common drinking cup, and, before long, they will be visiting their physicians, not as simple-minded folk seeking advisement, but as friends, discussing their illnesses and reviewing their own cases in intelligent consultation. Two heads are better than one, and I shall ever prefer the somewhat medically educated patients, for they have proven of untold assistance to me on several occasions, in difficult diagnoses, by their extraordinary power of self-analysis. Show me the man who has never been helped by some sensible patient's inadvertent suggestion!

Be that as it may, this public instruction is the gradually building foundation upon which the future of this, or any similar propaganda must rest, and the Committee on the Conservation of Vision of the American Medical Association, during the year ended last June, accomplished the following:

1st. The furnishing of a popular eye article each week for the Press Bulletin, which, being distributed free every week to about six thousand newspapers, insures the reading of such useful articles by hundreds of thousands of readers annually.

2nd. The printing and distributing of twenty practical pamphlets, written by eminent ophthalmologists, on eye subjects, to both medical and lay readers. These are called the Conservation of Vision Pamphlets, and are sold or given away singly or in sets. They have been most successful and some of them are, already, in their third edition.

3rd. The establishment of a lecture bureau in most of the States, and the delivering of popular stereopticon lectures on the Conservation of Vision, in a manner suited to the laity. Thirty States, last month, reported successful lecture seasons, and that 339 lectures were given by 190 lecturers, in 283 cities, to audiences aggregating 69,425 people. (This is the record of the first or experimental year.)

4th. Through the mediumship of the lectures, the annual, systematic medical inspection of school children's eyes, etc., has been adopted in over two hundred cities.

A more vigorous campaign than ever has been mapped out by the committee, and hundreds of lectures in various parts of the country have, already, been arranged for during the ensuing season.

The State societies are prepared to send lecturers, literature, or anything that the county physicians may desire in the line of public instruction, should such physicians be interested in disseminating the seeds of this good work among their people.

In conclusion, permit me to state my belief that the time must and will come when the gravity of the situation will be so universally recognized that there will be one uniform, national law relative to Ophthalmia Neonatorum, the most important single subject in the array of causes of preventable blindness which I have presented to you, and that this law will require, not only report of the disease at once, but the instillation at birth of the Créde prophylactic as already demanded in some countries. Money, consciences, reputations, as well as the patients' vision, can be conserved to us thereby.

AN OPERATION FOR PTOSIS WITH THE FORMATION OF A FOLD IN THE UPPER LID.

By Professor MACHEK, Lemberg.

(*With seven illustrations in the text.*)

Translated from the *Arch. f. Augenheilk.*, Volume LXXVI., 1914.

OUR methods of operation for congenital or acquired ptosis suffice usually in exposing the pupil by raising the upper lid without producing lagophthalmus during sleep. The function of the eye is thereby restored and the position of the head improved. The cosmetic result, however, is far from ideal. Any operation on the face is of a great importance for the individual's success. The patient should not only be able to see, but his appearance has also to be as near normal as possible. A ptosis operation must therefore fulfill the purpose of giving the desired cosmetic result.

In order that the eyes possess a natural appearance, the upper lid must show an extensive fold. It is well known that fibers pass from the elevator of the lid to the skin of the lid. On raising the lid the skin of the lid is drawn in above the convex margin of the tarsus, deep in between the eyeball and the upper margin of the orbit. A furrow ensues which is partly covered by the overhanging upper lid. This fold becomes less marked in age, on account of the atrophy of the orbital fat, and the skin sinks in, producing a depression between the eye and the upper orbital margin. The absence of this fold of skin suggests a pathologic and senile appearance. Most of our ptosis operations do not restore this fold of skin, or it is restored to an unnatural degree. Our young patients are therefore dissatisfied, and as the cases which require operation

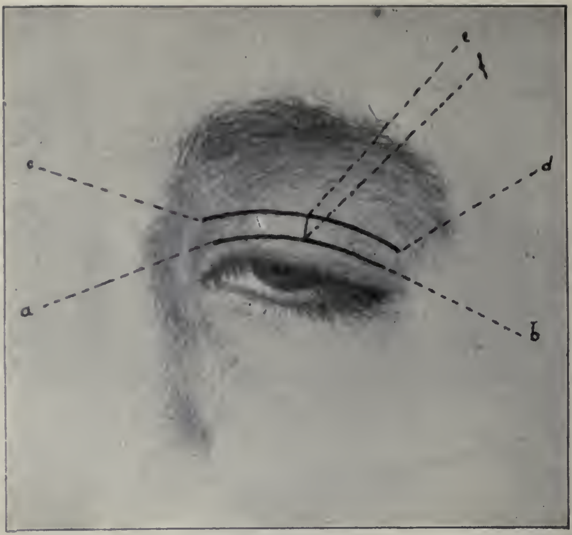


FIG. 1.

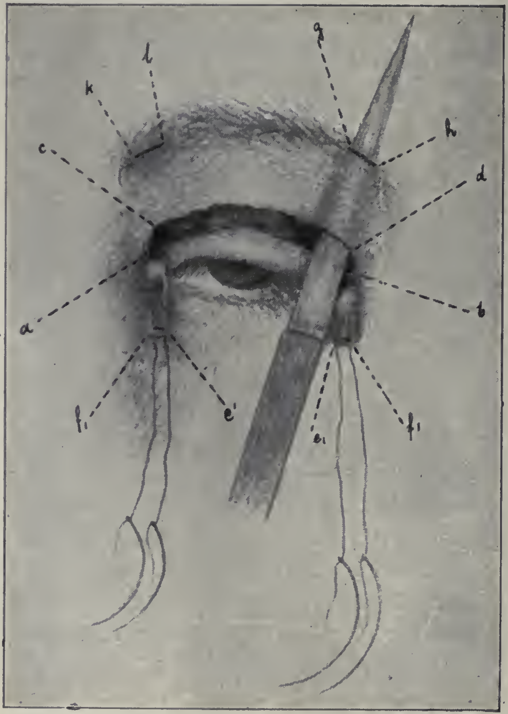
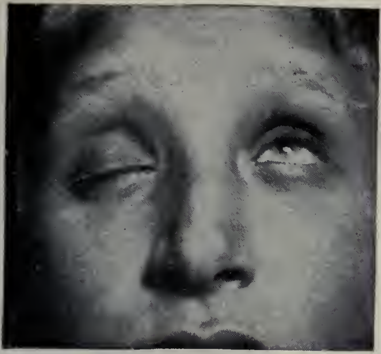


FIG. 2.



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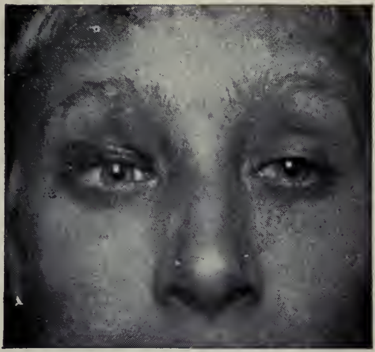

FIG. 4.

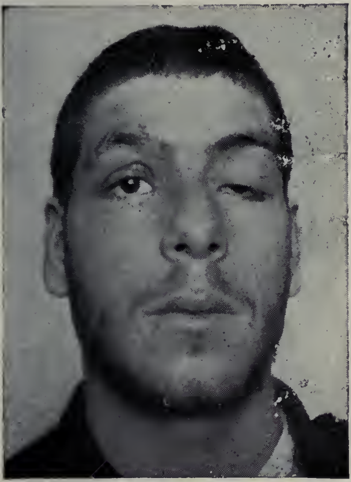

FIG. 5.

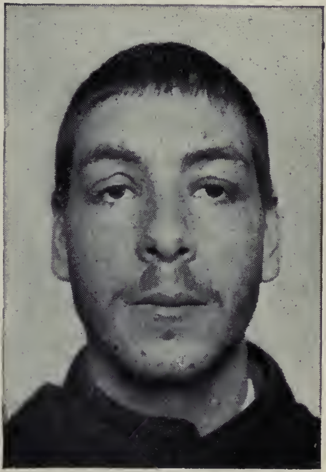

FIG. 6.

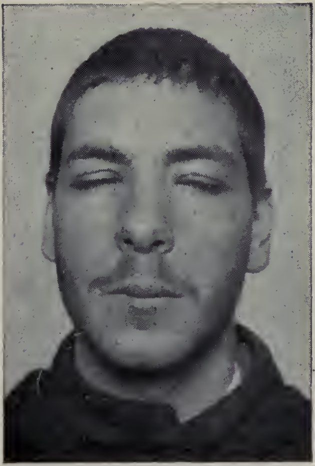

FIG. 7.

are usually congenital, this feature increases the difficulties of the operator.

In 1911, in Cracow, I suggested a procedure which answers these cosmetic demands. The lids are fixed to the eyebrows by two narrow and short flaps of skin of the lid which are passed subcutaneously on each side toward the eyebrow, thus producing a satisfactory fold in the upper lid. The idea of fixing the lid by means of a flap from the skin of the lid was originally suggested by Hunter. Panas has made use of the same idea in his operation. He formed the flap from the middle of the lid. This took away too much skin for the proper formation of a lid fold, and an unsatisfactory fold resulted. The procedure described below, following the idea of Hunter and Panas, has other attachments for raising the lid and leaves enough of the skin of the lid in order to form a large and natural fold. The flaps of skin are so thin as to cause an elastic connection. The final result is entirely satisfactory from a cosmetic standpoint.

OPERATION.

1. An incision a b is made 6*mm* above the margin of the upper lid and parallel to it from one extremity of the lid to the other.

2. The second incision, c d, passes about 5*mm* above this and parallel to a b and is at each extremity slightly longer.
3. The third incision, e f, divides the long strip of skin a b c d.
4. From e f the flaps c e f a and d e f b are dissected from the tarsus and freed, except for their attachment at a c and b d to the skin of the lid. Both flaps contract somewhat and hang down. (Fig. 2.)

5. Internally from d (Fig. 2) a doubly-cutting pointed knife is introduced underneath the skin of the lid and emerges in the eyebrow at g h. In this canal a groove director is introduced. A similar incision is made subcutaneously, emerging at k l and another director introduced.
6. A suture with two needles is then introduced in the lowest part of the skin flap from the internal surface outwards.

The needles are then passed in the directors in the direction of g h and k l. The sutures draw the flaps after them and by tying the sutures at k l and g h the flaps are fixed in their new position. They raise the lid and produce a fold which projects over the defect a c d b. The epidermis on the submerged skin flaps can be removed. It is sufficient, however, to scrape them mildly. It is not necessary to close the wound edges a b and c d with sutures.

The dressing consists in gauze covered with vaseline and a piece of rubber tissue, then a dressing.

What is the result of the operation? The lid can be raised as much as we wish and the pupil is free. The raising is obtained by the contraction of these thin elastic skin flaps, which, however, do not prevent closing of the eyes nor the reflex palpebral closure. In looking straight forward, the eye remains open on account of the rigidity of the skin flaps, without contraction of the frontalis muscle. The eye is closed by contraction of the orbicularis fibers. In our cases the normal tone of the orbicularis fibers has been sufficient to close the eye during sleep. After elevation of the lids on account of the lateral disposition of the two skin flaps, a fold results which hangs down along the entire length of the lid.

It is important that after the operation there should be a slight lagophthalmus, which will disappear in a few days. The lid will be raised according to the height at which the skin flap is fixed above the eyebrow. If the effect desired is not great, the knife can emerge below the eyebrow. As the effect does not change in the course of the after-treatment, the final effect must be obtained at the time of operation.

In the after-treatment it is important that the sutures are not removed too early, otherwise the elevation may not be sufficient. We usually leave the sutures for from between four to six days. If the bandage is left off, the sutures should be covered with adhesive plaster. The swelling and the redness does not disappear short of from four to six weeks. The operation can be employed in every form of ptosis which requires operative treatment. It is particularly to be recommended in the congenital form in young people, on account of its good cosmetic result. I am adding the histories of two cases which were operated on in 1911. In one the ptosis was

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one-sided and congenital, in the other it was a congenital bilateral affection.

Case 1.—Monolateral congenital ptosis. Patient 18 years old. The right upper lid covers the cornea. By contraction of the frontalis muscle, the lower margin of the pupil is exposed; the eye muscles are normal; vision $\frac{6}{6}$ May 17, 1911, the right upper lid was operated on by the method just described. Three days later slight lagophthalmus on attempted closure of the eyelids. The sutures were removed on the fifth day and the lids can be closed. The furrow in the lid is visible. Photograph shows the present condition. There is no difference between the two eyes, except that the lid furrow in the operated on eye is somewhat more noticeable than on the other eye.

Case 2.—Bilateral ptosis. A. B., 20 years old, admitted December 12, 1911. Except for the deformity of the lid and a restriction in the movements of the eye upwards, the eyes are otherwise normal. December 18, 1911, the right eyelid is operated upon. The sutures are removed on the sixth day. The photograph, Figure 5, was taken on the twenty-third day after operation. The lid furrow is distinct and appears like the normal one. The left eye was subsequently operated on and eight weeks later the photograph of Figure 6 was taken. The result is a very favorable one: The closure of the lid takes place normally, as is seen in Figure 7. In closing the eyelids the fissure in the lid remains. Every experienced operator must acknowledge, after seeing these photographs, that the result is satisfactory, especially from a cosmetic standpoint. In this, I believe, the restoration of the furrow of the lid is the principal factor.

ETIOLOGY AND PATHOLOGY OF BRAWNY SCLERITIS.

By Dr. W. GILBERT, Munich.

(*With one illustration in the text and Appended Plate No. XXIII.*)

Translated from the *Arch. f. Augenheilk.*, Vol. LXXVI., 1914.

SINCE Schlodtmann's (1) first original publication on a peculiar disease of the sclera characterized by a gelatinous infiltration, eight cases have been examined pathologically. Our knowledge of the etiology of this condition has, however, not been advanced. The descriptions of this condition have been uniform, and Komoto describes the disease, to which he gives the name annular scleritis, as follows: It affects men in advanced life, and usually in both eyes. The disease is localized to the anterior segments of the eye, occasionally extending as far as the equator. It is characterized by an infiltration of the subconjunctival tissues and of the sclera with mononuclear cells, with large nuclei, and with but little protoplasm, with congestion of the subconjunctival blood and lymph vessels, leading to necrosis of the scleral fibers and complications with keratitis, iritis, and choroiditis. In all reports of these cases by Schlodtmann (1), Friedland (2), Uhthoff (3), Parsons (4), Procknow (5), Roosa and Oatman (6), Bietti (7), and Komoto (8), the statement is always met that tuberculosis and lues are not to be considered etiologically. Bietti is the only one who believes that tuberculosis plays a part in his case.

I wish to report upon a case belonging to this group, which throws some light upon the etiology and presents some hitherto unobserved features in the anatomic examination.

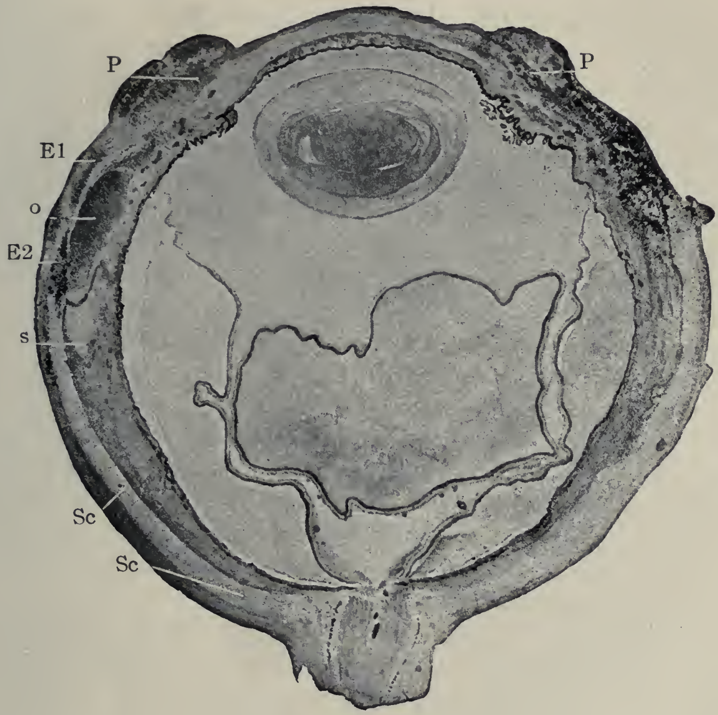
A woman, 76 years of age, with gouty nodules in nearly all finger joints as well as the middle of the foot, was taken ill in the beginning of May, 1911, with a severe inflammation of the left eye, which then led to a moderate exophthalmus and immobility. The conjunctiva protruded over the cornea like a gelatinous ridge and covered over a bulging of the sclera. The cornea was the seat of a dense vascular opacity. The swelling of the scleral conjunctiva increased continuously with severe pain, and it became necessary to remove the blind eye on June 6, 1911. The eyeball was hardened in Birsch-Hirschfeld mixture.

The right eye has remained healthy (February, 1913). Tuberculin and Wassermann reactions were negative.

The result of the pathological examination can be briefly given as follows: (A complete description will be found in the dissertation of Levin.)

The conjunctiva and episclera are swollen and protrude like a wall round the margin of the cornea, particularly below and to the outer side. The many blood-vessels show on section a pronounced perivascular infiltration, consisting principally of plasma cells (P). This plasmocytic infiltration extends with the ciliary blood-vessels through the sclera into the depths to the outer layers of the ciliary muscle. The most marked changes are to be found in the lower and the outer part. In this region the outer layers of the sclera, namely, the part over the flat portion of the ciliary body, there is an area composed of pus cells which has separated the scleral lamellæ (E 1). These cells are usually polynuclear leucocytes which have disintegrated to a great part. In addition to the cell necrosis there is a necrosis of many of the scleral fibers. Somewhat farther back in the region of the ora serrata there is another zone of infiltration in the deeper layers of the sclera, which consist principally of necrotic cells (E 2). The intervening spaces between the scleral fibres which are swollen and separated contain a finely granulated detritus, the fragments of disintegrated leucocytes, which gives the whole region a diffuse blue color after staining with hemalum (Plate XXIII n). This deep area of necrosis and infiltration in the sclera extends backwards into a purulent focus which has developed in the suprachoroidal space separating the choroid from the sclera (Plate XXIII o). This is also composed of necrotic cells and the remains of leucocytes. A little farther back the suprachoroidal space is distended with a serous exudate containing many leucocytes.

In the equatorial region the outer scleral lamellæ are closely adherent to the episcleral vascular tissue, so that the sclera seems thickened. Below there is a superficial


P
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> infiltration with round cells which extends to the optic disk and follows the vortex veins into the interior of the eye. The surrounding orbital tissue is firmly adherent to the sclera, and the wall of the eyeball in places is three times as thick as it normally is. (Sc.)
>
> The choroid behind the ora serrata is thickened three or four times and shows an active round-cell infiltration with increasing leucocytes in the suprachoroidal space. This swelling and infiltration gradually subside going backward.

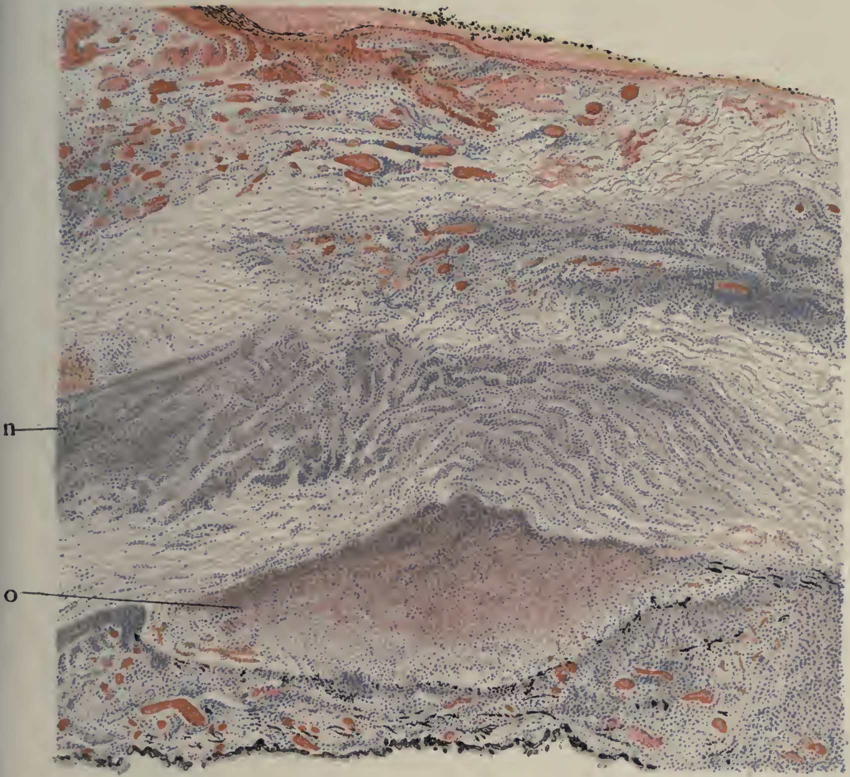
The detached retina and the optic nerve show no particular anomaly. The anatomic findings in practically all respects agree with those described in the previously published cases.

Corresponding to the more rapid clinical course, the inflammatory changes present a more acute character. Of particular interest in these cases are the tissue and the cell necroses in the sclera, as the etiologic importance of gout in our case cannot be doubted. It is well known that necrosis is a typical and a constant condition at the site of the urate deposits.

In literature on the pathology of gout formerly the views were divided, whether the tissue necrosis or the deposits of urates was a primary condition. According to Epstein (9), the necrosis of tissue following injury by the soluble neutral salts followed the deposits of urates. Rosenbach (10) showed that crystals may be formed by healthy tissue, and to-day a tissue necrosis is regarded as the injurious result of the crystals and, as Krause (11) states, necrosis without deposit of urates does not exist in gout.

Similar necroses in the sclera have been described in the cases of Schlodtmann, Friedland, Komoto, and Uhthoff and, in a case of posterior scleritis, by Wagenmann (12), without drawing attention to the etiological importance of gout. The presence of giant cells (Schlodtmann, Friedland, Uhthoff) is of particular interest, for Bennecke (13) has found giant cells in the granulation tissue of old gouty nodules. Riehl (14) saw the development of granulation tissue with large masses of giant cells about the crystal deposits, which Rosenbach regards as urophages.

This, to my mind, explains the nearly constant anatomical picture of necrosis and giant cells in this form of scleritis occurring in old individuals, where tuberculosis and lues are excluded.



H. Lodemann fec.

Gilbert, Zur Ätiologie und pathologischen Anatomie der sulzigen Skleritis.

Verlag von J. F. Bergmann, Wiesbaden.
Königl. Universitätsdruckerei H. Stürtz A G. Würzburg.

This case of gelatinous scleritis, which coincides both clinically and anatomically with those previously described, is the first one for which gout has been regarded an etiologic factor. The tissue necrosis of the sclera may be regarded as the result of the uric acid deposits, though the uric acid crystals could not be demonstrated on account of the preservation of the eyeball and its being kept in watery fluids. The conditions in the eye are, however, not so simple. Wessely (15) has shown how slight a reaction follows the injection of small amounts of mononitrium urate into the anterior chamber of the rabbit. I have injected small quantities of this sort into the superficial scleral lamellæ of the rabbit and have succeeded in producing only a transient redness. The eyes were examined after from five to eight days, and a moderate cellular infiltration was the only sign to be found at the site of the deposit. This negative result in animal experimentation cannot surprise us, because the deposit of urates in gout is only the final link in a complicated disturbance of metabolism.

In the previous descriptions of these cases nothing is mentioned of gouty diseases. Very probably marked gouty symptoms were not present. It would therefore be wise in future cases where the relationship to gout is not apparent to examine the blood for uric acid in the light of modern investigation (16). It will probably then be found that gout can be regarded as a more frequent cause. According to Krückmann (17), many cases of iritis depend upon latent gout, and there are cases with a variety of indefinite symptoms affecting the muscles and the joints without the presence of attacks of gout or tophi and where the first manifestations of gout show themselves in the eye.

Furthermore the plasmocytic perivascular infiltration of the conjunctiva and episclera is noteworthy in the places of gelatinous swelling. In the other reports of these eyes the character of the infiltration in this gelatinous swelling is not described, probably because the processes were of longer duration. According to Riehl, the deposits of the urates give rise to an inflammation in the surrounding tissue and the development of the granulation tissue. And Aschoff (18) has found the disintegration of crystalline masses through penetrating granulation tissue.

The plasma cells, which are a further development of lymphocytes and other lymphoid early stages in inflammatory processes [Pappenheim (19), Schaffer (20)], take part in the elimination and the intracellular digestion of waste products. The enormous collection of plasma cells about the necrotic scleral foci may be regarded as a reaction to the deposits of urates and the necrosis. This view is furthermore confirmed by the findings of numerous plasma cells in experimentally produced urate deposits in rabbits.

After closure of this paper, an article by Verhoeff appeared in the *Ophthalmoscope*, 1913, on a similar theme. He found in his cases and in the specimens from Schlodtmann and Friedland's cases principally plasmocytic infiltrations. As the Wassermann reaction in his case was positive, Verhoeff believes lues to be the probable cause.

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REPORT OF THE TRANSACTIONS OF THE SECTION ON OPHTHALMOLOGY OF THE NEW YORK ACADEMY OF MEDICINE.

By GEORGE H. BELL, M.D., Secretary.

H. H. TYSON, M.D., CHAIRMAN. APRIL 19, 1915.

Dr. J. Bruder presented a patient upon whom he had done a **trephining for detachment of retina.**

S. B., aged 48 years. About sixteen months ago the vision of left eye became suddenly obscured and there was severe pain in the head over the frontal region. Patient came to the clinic on December 17, 1913, about two weeks after the onset.

Vision O. D. $\frac{20}{70}$ Tension O. D. 25*mm*
O. S. Hand movements O. S. 12 to 14*mm*

Details of fundus not discernible, owing to hazy media. Wassermann negative; urine negative. KI was prescribed in increasing doses, which patient took for a period of about four months, when the vitreous cleared up, and a very extensive detachment of the retina came to view, occuping the entire lower half and extending over to the temporal side. With the clearing of the media her vision improved to $\frac{20}{200}$ at the end of six months, where it remained up to the time of the trephining. On December 6, 1914, about one year after the onset, the patient was trephined over the detachment. She remained at the hospital for five weeks. Her vision improved, as noted, from time to time, and at the present she sees $\frac{20}{30}$ +

Dr. T. H. Curtin said this was an interesting case to him, as he had reported a similar one last December. His patient now has vision $\frac{20}{20}$.

Dr. J. E. Weeks was pleased to see this case. He had trephined a case of detachment, but did not get a good result.

The field was about the same since operation as before. The vision had improved a little. He thinks well of the trephine operation.

Dr. W. B. WEIDLER asked Dr. Weeks if he had aspirated after trephining. He thinks it is necessary to aspirate after trephining.

Dr. WEEKS said that in his case it was not necessary to aspirate, as the fluid came out at the time of the operation.

Dr. T. H. CURTIN showed a case of **dislocation of lacrimal gland of each eye** in a young man, aged 22 years. When first seen there was great swelling of the upper and lower lids of both eyes, especially marked in O. S. This condition had been getting worse for a year and a half. On March 4th he extirpated the lacrimal gland of the left eye. No recurrence of œdema since that time. Since operation on left eye, tenderness and œdema have increased in the right eye.

Dr. DUANE said that dislocation or enlargement of the lacrimal glands had something to do with nutritive disturbances. Some time ago he saw a patient with recurrent erosions of the cornea who had an enlarged lacrimal gland. After removing the gland the erosion of the cornea disappeared.

Dr. M. J. SCHOENBERG did not see why the glands were removed for the swelling. He thought it was a case of blepharochalasis.

Dr. J. H. CLAIBORNE and Dr. W. B. WEIDLER agreed also that it was a case of blepharochalasis, and not a dislocation of the glands.

In closing the discussion, Dr. CURTIN said he did not show this case as one of blepharochalasis, but as a case of dislocation. The patient had improved since the removal of one gland and he proposed to remove the other.

Dr. T. H. CURTIN showed a case of **choroiditis areolaris** in a woman forty years of age.

Family history negative; Wassermann and urine negative. Von Pirquet slightly positive. Vision with correction about normal. This special form of choroiditis was first described by Förster. In this form, the first foci develop in the yellow spot, while the subsequent ones make their appearance at a constantly increasing distance from the latter. The most recent foci, therefore, are always those situated at the periphery. This is probably a variety of choroiditis disseminata.

Dr. J. H. Claiborne thought Dr. Curtin's case was one of colloid excrescences (Drusen). The yellow dots so conspicuous in this case are known under various names, and are called by the Germans "Drusen."

Dr. J. E. Weeks also disagreed with Dr. Curtin in the diagnosis of his case. Dr. Weeks said the masses seen there were situated on the inner surface of the lamina vitrea of the choroid, which are known as warty excrescences. At first the vision is not affected, but ultimately it becomes impaired.

Dr. J. Bruder said that he had seen a number of cases of "Drusen," or colloid degeneration of the choroid, but he thought Dr. Curtin's case was one of retinitis punctata albescens.

Dr. H. W. Wootton had followed one case of degeneration of the choroid for ten years. At first vision was $\frac{20}{30}$; ten years later it was $\frac{20}{40}$.

Dr. J. E. Weeks showed a case of **myxosarcoma of orbit** in a child seven years of age. When Dr. Weeks first saw the patient there was enormous swelling of the lids. The tumor kept increasing, and on February 5th he performed an exenteration of the orbit. Before operation a piece of the tumor had been taken out and a diagnosis made. He first produced a granulating surface, and then lined the orbit with Thiersch grafts. The healing was uneventful. So far there have been no signs of recurrence.

Dr. Herman Jarecky presented a case of **bilateral anophthalmos** in two sisters.

Six weeks ago, he was asked to see a newborn female baby who had no eyes. Then to his surprise he was informed that a sister, seven years old, suffered from the same anomaly.

The family history is as follows: The parents are unrelated. The father, 35 years old, a Russian, has always been well, and has no eye trouble. His family history is negative.

The mother, 33 years old, a Russian, married fourteen years, also gives a negative family history as regards eye troubles or deformities. There is no specific or alcoholic history. The mother has had six pregnancies: first, a perfectly formed girl, died of pneumonia when two years old; second, the seven-year-old girl, born without eyes; third, a four-and-a-half-year-old girl, perfectly formed; fourth, a stillborn boy, carried seven and a half months, perfectly formed; fifth, a miscarriage at two months; sixth, the girl baby born six weeks ago, in perfect health and well formed except the absence of both eyes. Thus the second and the sixth were the ones in which the abnormality occurred. The confinements were normal, no instruments used, and there is no history of maternal impression.

On examination, the older sister whom I present to-night is healthy and well developed in every other respect. There is no evidence of congenital syphilis. The lids are small, but well formed and furnished with lashes. The puncta can be seen, the child sheds tears when she cries, which flow down her cheeks. On separating the lids the conjunctival sac appears, but no trace of a globe can be seen or felt. When the girl turns toward the bright light, the sensation seems to affect her, and tears flow. The girl is mentally bright and intelligent.

The baby girl presents the same features of missing globes, with small well-formed lids and lashes, and has no other deformity.

In a search through the literature, I find Treacher Collins, in the *Ophthalmic Hospital Reports*, Volume XI., 1886–7, Cases VII. and VIII., and also XII., XIII., XIV., mentions the same occurrence in two sisters, the elder five years and younger four months, an intermediate child (a boy) unaffected. The other reference is of three children in a family of eight, the first, second, and fourth. The first a male, the second a female, the sex of the third not mentioned. One died at six, the second in the eighth month, and the third was living, aged fourteen. The cases of bilateral anophthalmos seem to be more common than the monophthalmic ones.

In these cases, according to Collins, as quoted above, no primary optic vesicle had budded out from the anterior primary encephalic vesicle, or having budded out it had failed to form a secondary optic vesicle.

Dr. CLAIBORNE thought all such cases should be transilluminated.

Dr. Linn Emerson presented a case of **tear of cornea and sclera covered by conjunctiva.**

The patient, ten years of age, struck his eye on the arm of a chair, resulting in a tearing of the sclera and conjunctiva, with prolapse of iris and ciliary body. The vitreous projected through the gaping wound; also the lens presented at the wound.

Dr. Emerson cut off the prolapsed iris, dissected the conjunctiva back to near the middle of globe, and then united the conjunctiva over the cornea, putting no stitches in sclera. The eye has quieted down, but there is still some wrinkling of Descemet's membrane. It looked like a case of enucleation when he first saw it.

Dr. W. B. Weidler presented a case of **tuberculous keratitis.**

Y. P., aged 36 years, Hungarian; female; family history negative, and personal history negative. Her present eye trouble began four years ago, and she has been under treatment, more or less, all of the time for this condition, which has gradually become worse. First came under observation at the Manhattan Eye, Ear, and Throat Hospital four months ago, at which time she states that all the doctors who had treated her said the condition was due to syphilis. Wassermann negative; Von Pirquet was positive. Patient was admitted to the hospital and given a subcutaneous injection of ½*mg* of old tuberculin, with marked local and general reaction. Vision in right eye, fingers at six inches; vision in left eye, fingers at twelve inches. After being under treatment for six or eight weeks the vision increased to: right eye, $\frac{2}{300}$, ; left eye, $\frac{20}{200}$. Recently the condition in the left eye has become much worse, due to fresh infiltration in the centre of the cornea in the deep stroma.

Dr. M. J. Schoenberg made some remarks on a case of **tuberculous iritis** which he had shown at a previous meeting.

Dr. J. H. Claiborne read the report of a case of **mydriasis from the seed of the Jamestown weed.**

Two gentlemen were hunting in the fields of Eastern Virginia; the one who happened to be in front kicked a small shrub with his foot. The rear one felt something fly into his right eye, but it gave him no further concern for several hours. Later, on board the train, he noticed an irritation of that eye, and observed that his pupil was dilated. On inspection, his wife skillfully removed from the lower lid what appeared to be two dark seeds stuck together. The following day, his pupil being no better and his sight being blurred, he came to consult me about his pupil and his vision.

As soon as he had related the facts of the case, I suspected, from my acquaintance with the flora of the region where he had been hunting, my own native heath, that he had been poisoned by the seeds of the Jamestown weed. I requested him to write to his friend in Virginia, asking him to go to the fields through which he was walking, pluck and send me, if possible, a sprig of the shrub which he had kicked. In a few days my patient brought me several leafless, dried stems of a shrub having prickly pods. I immediately recognized the specimen as the pods of the Jamestown weed, or *Datura stramonium.* The moisture and heat of the eye doubtless softened the cortex and the alkaloid produced this effect. On biting into one of the seeds, I noticed the characteristic taste of the Jamestown weed, with which I was acquainted from my boyhood. Not content with my own recognition of the plant, I took it to the College of Pharmacy, in this city, where Dr. Ballard, the botanist, likewise recognized it as *Datura stramonium*, and gave me some information concerning its habitat in this country. It grows from Nova Scotia to the Gulf, in California, Texas, and Mexico, as *Datura stramonium*, *tatula*, *fastuosa*, and *metel*, the most usual form being the one concerned in this case. The farther south it grows, the stronger the percentage of alkaloid contained. This plant belongs to the same order as the belladonna, or deadly nightshade, the Solanaceæ, all of which have the physiological effect of dilating the pupil either when directly introduced into the eye or into the general system in sufficient doses to produce its physiological effect.

I have often come in contact with this plant when I was a boy, but never knew a case of poisoning from it, and I have never heard of one proceeding from the seeds. The leaves likewise contain the active principle, and a case which was narrated to me personally by Dr. Holzclaw, of Chattanooga, Tenn., established this fact.

In 1898, when my regiment was stationed near Chattanooga, Dr. Holzclaw told me of the case of a gentleman in his private practice who awoke one morning with a widely dilated pupil and inability to see objects near by. It was his right eye. He consulted a number of physicians in the city without any satisfactory explanation, and naturally was much alarmed. He finally fell into the hands of Dr. Holzclaw, who cross-examined him concerning every act committed during the antecedent two or three days; finally, the patient admitted taking a walk the day before, which was Sunday, through the fields. Dr. Holzclaw asked if by any chance he had touched any shrub. He remembered pushing aside a bush which was in his way with his right hand, and tearing off a few leaves of it at the same time. Dr. Holzclaw requested him to go with him to the place, and on finding the identical bush, he recognized it as the Jamestown weed.

I am rather inclined to think that, if I had not known of this case, I might have missed the diagnosis in mine. A suddenly dilated pupil from no obvious reason is an alarming symptom even to the experienced in medicine. To the laity, it is naturally mysterious. It suggests to the experienced, third nerve paralysis, glaucoma, or beginning general paresis. It is important always that the cause of the dilatation be thoroughly investigated, not only for scientific accuracy, but for the peace of the mind of the individual who is affected. My patient was an educated and intelligent man who, though not greatly alarmed at the symptoms, was very much relieved mentally by the quick diagnosis. As a certain Latin author says, "Fortunate is he who can recognize the causes of things."

Dr. ALEXANDER DUANE read a paper on **Minor aids in ophthalmic work,** which appears in this number of these ARCHIVES.

REPORT OF THE TRANSACTIONS OF THE OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

ANNUAL CONGRESS.

By C. DEVEREUX MARSHALL, F.R.C.S.

The Annual Congress of the Society was held on Thursday, Friday, and Saturday, April 22nd to 24th, under the presidency of Mr. F. RICHARDSON CROSS, of Bristol. The discussions were held at the Headquarters of the Royal Society of Medicine, and the clinical meeting at the Royal London Ophthalmic Hospital, City Road. There were two set discussions, and a large number of other contributions.

Mr. CHARLES WRAY (Croydon) contributed a paper on the **diagnosis and treatment of bony tumors of the orbit.** With regard to their removal, he contended that the figures of Herschfeld placed the subject in its true perspective. They showed that the mortality in cases of sinus growths—frontal, ethmoidal, and sphenoidal—were 48.2, 80, and 100% respectively; whilst the post-operative mortality was 13.6, 12.7, and 33%. The two main methods of diagnosis were by palpation, and the use of Röntgen rays. As examination by fingers was too limited, he advised the use of a thin flexible spatula 10*mm* wide and 2*mm* thick at the ends. This, pressed on the skin under the supraorbital notch, passed 15*mm* under the lid and via the fornix 33*mm*, *i. e.*, within 12 or 13*mm* of the sphencidal fissure. The measurements at the lower orbital margin were 12 and 16*mm* respectively; while at the inner and outer canthus the distance reached was 15 and 21, and 11 and 22*mm*; and as the usual distance from the margin of the orbit to the rectal spine was 45*mm* it was possible thus to investigate half the outer wall of the orbit. In the living subject it was desirable to administer morphia an hour, and deep injections of novocaine ten minutes, before beginning the examination. As to the operation, he laid stress on the importance of dissecting up the superjacent membrane if present, and the periosteum, so as to shut off, as efficiently as possible, the field of operation from the contents of the orbit. Having tested the hardness of the growth, an attempt should be made to test the strength of the attachment to the bone, as slight leverage might snap the pedicle. If this did not occur, and the tumor was cancellous, it should be removed piecemeal, so as to discover its relation to the orbital wall. If originating from a subjacent sinus, and especially if hour-glass-shaped, the bone should be cut away so as to allow of easy removal in the safest direction. Two important landmarks were the inner canthus (over the anterior extremity of the middle turbinated) and the anterior ethmoidal foramen (giving the level of the cribriform plate). Frontal-sinus cases were the most frequent, and usually presented at the upper and inner part of the orbit. No operation should be undertaken in the presence of material alteration in the roof of the orbit as revealed by X-rays. Ivory exostoses could not be removed piecemeal. As in the cancellous variety, gentle leverage was in order, and, in the event of failure, sufficient of the orbital wall should be cut away to permit of removal in the safest direction. A clue to the size and location of the growth was obtained by radiography and the use of a strong needle.

Mr. W. D. Harmer read a paper on the **intranasal treatment of dacryocystitis.** As nasal inflammations and abnormalities rarely cause dacryocystitis, treatment of such conditions is generally disappointing. Intranasal operations on the tear sac or duct became popular in 1912, after the operations of West, Polyak, and Yankauer. A modified West operation has been preferred. Of fourteen cases treated, six have been cured, three improved, four not improved and not traced. Operations are easy to perform, and can be repeated if necessary. Dacryocystotomy is probably the best treatment for dacryocystitis.

Capt. A. W. Ormond read a paper on **injuries to the eye in warfare.** He recounted three cases of traumatic amblyopia following the explosion of shells. The first was of a soldier who was in the retreat from Mons. He recovered entirely after complete rest and "feeding up." A second case was associated with an error of refraction which had led to the idea that recovery had not taken place; while the third had not yet regained his former sight, though wounded more than three months ago. It was pointed out how difficult these cases are to diagnose, and how important it is to take the psychology of the men into consideration. He described the frequency of "explosion injuries" peculiar to the war, the result of hand-grenades, shrapnel, or high-velocity shells; numerous cases had occurred in which, as the result of a general explosion, small fragments of metal or dirt had been forced through the tunics of the eye; these had sometimes been overlooked, and later on, the man having complained of pain and inflammation, iritis had been correctly diagnosed, but the possibility of a foreign body being in the eye had not been realized, and sympathetic trouble might have occurred. He related two cases in which the speedy removal of the eye prevented sympathetic trouble supervening. With regard to the vexed question of removing an eye containing a foreign body, he recommended that no general dogmatic statement should be made on this debatable point, as each case must be separately considered. He deprecated relying solely on the findings of X-ray examination, because in several cases the foreign body was not discovered until a second or third radiogram had been taken, and sometimes not even then. The history, the nature of the inflammation, if any, and the amount of vision, should be taken into consideration when making a decision. Short notes were given of twenty-eight blinded soldiers, most of whom were now at St. Dunstan's, Regent's Park. Thirteen of them have no perception of light at all; and the sight of those with vision ranged from mere perception of light to ability to count fingers in one part of their field. Eighteen were the victims of bullet wounds, which, for the most part, traversed the front part of the head from side to side; four were wounded by shrapnel, one by a hand-grenade, and the others by explosion, the exact nature of which the men did not know. One, however, was due to a bullet hitting the magazine of the man's own rifle, which exploded in his face. The author remarked on the extraordinary malignancy of these bullet wounds, several of the men when looked at appearing absolutely fit, often with both eyes intact, the scars of entrance and exit wounds being almost impossible to locate. An account was also given of a serious corneal ulceration due to the gonococcus, caused, probably, by infection from a towel which had been in general requisition. Partial recovery ensued.

Mr. Cyril H. Walker brought forward a paper describing **cure of spontaneous detachment of retina by multiple scleral puncture.** The patient, æt. 39, had sudden loss of sight in part of the right field in September, 1901. Two days after the occurrence there was a large detachment above, the summit of which was estimated as 12 D. He had 4.5 of myopia. He was ordered complete rest in bed for a week, and then was allowed up for an hour a day. The detachment had now swung round to the lower part of the eye, with corresponding change in the field; vision had improved. A further fortnight of partial rest showed further improvement, and he was allowed out; but the sight rapidly got worse and the detachment increased. Improvement followed more rest in bed, but it was only temporary; in December the vision had fallen to $\frac{6}{60}$. He was ordered to bed again, and five scleral punctures with a discission needle were made 10*mm* from the lower border of the cornea. The retina was pierced at each puncture, and the needle was rotated 90° after the last puncture, to let out some of the subretinal fluid under the conjunctiva. On December 21st the sight was immensely improved, and he resumed full work on March 4, 1902, with vision $\frac{6}{6}$ with glasses, and a normal field. The condition had been maintained ever since, and the only sign of detachment was the presence of a little pigment below in the choroid.

Mr. Cyril H. Walker also read a communication on **angiosarcoma of retina.** The patient, æt. 4 years, was seen on November 11, 1914. Eight months before there was said to have been a film over the right eye; no pain or redness. It disappeared in about six weeks. In June and September there was some pain in the eye, but the boy had regularly attended school to the end of October. The right eye was seen to be the seat of a brownish-yellow hypopyon. There was no ophthalmoscopic reflex; the tension was normal, and the pupil dilated well with atropine. There was doubtful perception of light. The left eye was normal, and the patient's general condition good. Ten days later the eye became red and tender, and there was some continuous pain; the tension was *plus* 1. The contents of the anterior chamber were evacuated, and Professor Walker Hall reported that the material was probably sarcomatous. The eye was accordingly excised, and submitted to the same authority. Early in December some ¾ inch of the stump of the optic nerve was removed, with a mass of tissues surrounding it. Pathological examination showed that recurrence had commenced in the stump of the nerve and the surrounding tissues, but there was a small margin of healthy tissue. Dr. Osborne, of Ilfracombe, reported to him that recurrence took place within a fortnight of the second operation, and that the mass had attained the size of a cocoanut. The boy's mental condition was not affected, and there had been no metastasis. The specimen showed that the ciliary region was not invaded.

Mr. M. S. Mayou read a paper on a case of **retinitis pigmentosa treated by trephining,** the improvement following which had been maintained for four and one half months, in the hope that some light might be thrown on the ætiology of a little-understood disease. In this condition anything which improved the retinal circulation would temporarily benefit vision—such as the administration of amyl nitrate or subconjunctival injection and paracentesis of anterior chamber. Doyne had shown that extraction of the lens was followed by immense improvement in vision due, it was considered, to the fact that the patient was always in a condition of semi-daylight owing to the cataract, so that the retina did not receive sufficient stimulation. Mr. Mayou, while not denying this, thought that the lowering of the intraocular tension, with the consequent flushing of retinal vessels, and the filtration of fluid through the scar, might be an additional factor, possibly the most important one, in the good result. He, the author, thought trephining would result in the retinal vessels being flushed with blood, and that the subsequent leakage might lead to a more rapid excretion of fluid from the eye, and drain away any toxic products which might be causing local vascular sclerosis. The patient was a female, æt. 17, who for two years had complained of night-blindness. Grandfather, father, one paternal aunt, and one brother were all affected with the same disease. The four sisters of the patient were not night-blind. She showed marked pigmentation of the periphery, the disks being slightly gray in color, and the vessels of practically normal size. The lenses were clear. When first examined, the fields were contracted to a 10° circle on both sides. On November 13th last, and again on December 1st, paracentesis of the left eye was performed, and on each occasion there was distinct improvement in the fields. On December 8th, trephining was done under general anæsthesia. On removing the disk of sclera there was a very free prolapse of iris, and it was slightly caught in the wound; recovery was otherwise uneventful. A week later the field on this side had practically reverted to normal, and she could walk about freely in a darkened room. Improvement was maintained to the present date. On covering the unoperated eye she could see well at nighttime; but if both eyes were open she was still somewhat night-blind. He could not advance any explanation of this. The improvement could not be expected to last very long; but it might continue for a length of time which justified the operation in selected cases.

Mr. F. A. JULER read notes of a case of **papilloma removed from the upper canaliculus.** The tumor came away after slitting the canaliculus, quite easily; there was no apparent pedicle. It measured 10*mm* by 4.5*mm* and in structure was a papilloma with stratified epithelium.

Dr. GEORGE MACKAY (Edinburgh) read a short note on a case of **lymphangioma of the orbit with hemorrhages,** seen first in 1906, in a child who was then 15 months old. Paracentesis, and, later, excision so far as practicable, having failed to eradicate the growth from the apex of the orbit, X-ray treatment, given by Dr. Hope Fowler, had been employed, and with much benefit. Owing to the irregularity in the patient's attendances, proptosis had been allowed to recur, at intervals of one to three years, but had always yielded to further X-ray applications. The cure now appeared to be complete, and vision and movements were unimpaired.

Mr. G. COATS demonstrated a peculiarity of structure in the **choroid of the fruit-bat,** which was first observed by Lindsay Johnson. Instead of being smooth, the surface is covered with innumerable conical prominences, each containing a central vessel, which projects from the apex in the form of a long capillary loop. The outer surface of the retina has a similar serrated sectional outline. The condition is not found in any of the insectivorous bats, whose eyes in other respects also are inferior in development. It had been suggested that the structure was a device for the nourishment of the retina, in which central retinal vessels are absent in the bat. But many animals (*e. g.* the elephant and rhinoceros) which have a much thicker and more extensive retina have also no, or only rudimentary, central vessels; yet their retinæ obtain sufficient nourishment from a flat choroid without the sacrifice of form vision which the arrangement in the fruit-bat necessarily entails. According to another hypothesis, the structure is an accommodative mechanism, images of distant objects falling on the most anterior plane of the serrations; of near, the most posterior. Evidence was adduced to show that the range of accommodation so obtained could not be great, and that, inasmuch as the formation of a clear image was impossible, it could not be very useful. The most probable explanation was that the condition was a device to enable the eye to make the best possible use of low illuminations. Evidently, the serrated contour of the retina must greatly increase the superficies of the sensitive film, and augment the number of visual elements concentrated within a given area. In other respects also (its relatively large size, and the structure of the retina) the eye of the fruit-bat is characteristically adapted to a nocturnal habit.

Mr. Coats also demonstrated an encysted nematode parasite in the eyelid of the mouse. Professor A. E. Shipley, F.R.S., considered it to be *Ollulanus trienspis*, the adult form of which occurs in the alimentary canal of the cat.

The author also, in conjunction with Lieut-Col. W. G. Pridmore, demonstrated a filaria from the anterior chamber of the horse, probably an immature male of *Filaria equina.*

DISCUSSION ON OPHTHALMIC INJURIES IN WARFARE.

Mr. WALTER H. H. JESSOP, in opening the discussion on this subject, dealt chiefly with the cases he had seen from the present war on land, at St. Bartholomew's and No. 1 Base hospitals. He said that the steel or cupro-nickel mantle of the bullet was often chipped, and a fragment might perforate the cornea, or embed itself in its substance. The initial high velocity of the bullet might be lost by ricocheting from a stone, and he had found that wounds so produced were more serious than direct ones. As most of the fighting was in trenches, there was a greater proportion than usual of head and face injuries, as they were the parts most exposed to the enemy. There had been a few instances of spent bullets entering the orbit and remaining there without bursting the eyeball; they were probably ricochet. Such cases often showed intraocular hemorrhages, choroido-retinal changes, and detachment of retina, generally complete. The most distressing ocular injuries, usually caused by enfilading fire, were those in which the bullet passed transversely through both orbits. There must already have been at least fifty such cases. If it was found that a wound had been made in the orbital roof, the brain substance would fill it up; and as sepsis could not be prevented, it was better to leave well alone. When the orbit and eyeball were much damaged, it was better to foment the wound and keep it as clean as possible with sodium-chloride solution, delaying removal of the eyeball until the conditions were less inflamed, always having in mind the risk of sympathetic ophthalmitis if the other eye were a good one. In the case of both eyes being destroyed, it was better to wait until the danger of sepsis was over, or it was much reduced, before removing the destroyed eyeballs, owing to the risk of meningitis He described an operation devised by Mr. W. T. Lister to avoid opening the nerve sheath. Eyelid injuries he found to be very common, and almost always accompanied by injuries of the eyeball. Usually the lids became very œdematous, hence sutures should not be inserted into them. Conjunctivitis did not seem to have been prevalent in this war. In the Franco-German war, 55% of cases of eyeball injury developed sympathetic ophthalmitis; in the American Civil war, the percentage was 16.14. In the present war he had not seen or heard of a single case of the kind, which he attributed to the great care exercised in diagnosis and treatment, and especially the early enucleation of a ruptured globe. He had seen only one case of bullet wound implicating ocular nerves, and that case he described; it was a ricochet bullet. The bullet and shrapnel wounds of the skull vault were generally depressed, and there was a great frequency of papillœdema in such cases; the appearances were those due to pressure. Papillœdema was probably present in all cases of vault injuries, with increased intra-cranial pressure; it was not usually seen when this pressure remained normal. Fractures of the skull near the occipital lobes were often accompanied by hemianopsia. At the beginning of the war there were many cases of complete blindness following severe explosions; but sight returned at different periods up to a week. The condition in these cases was always bilateral. Some cases were deaf, in rarer instances the patient was dumb. Three of the men had extreme blepharospasm, so that they could not open their eyes for days. The initial shock in these cases was loss of consciousness, which, passing off, left loss of sight, deafness, or even loss of speech, all temporary.

Col. W. T. Lister, in a communication read by Mr. Jessop, said the outstanding features of the ophthalmic injuries in the present war were their severity and the impossibility, in most cases, of employing conservative surgery. Still, there was a great deal of work to be done. He grouped the cases into the following classes: Contusions, wounds, cases with foreign body in the eye, functional cases, and head cases. These he considered *seriatim*. In concussion cases, if the bullet did not go through the orbit the fundus showed no concussion changes. Ruptures of the choroid were fairly common, and they might be star-like or arranged in definite groups. The rest of the retina showed some pallor due to *commotio retinæ*. Penetration of the eye with small foreign bodies was a very unsatisfactory group of cases to deal with. Many of the particles did not give a sensible X-ray shadow, and even if they did, many of the fragments were non-magnetic. Two factors increased the poor outlook in operation: (1) the frequent presence of more foreign bodies than had been diagnosed; (2)

the friability of the foreign bodies, so that they broke off when caught in the forceps. It was difficult to know what to do in the case of a foreign body in the eye when the sight remained useful. He believed that even if an eye contained a foreign body, if there were no prolapse or entanglement of the uvea or lens capsule, the risk of sympathetic ophthalmitis was nil. Though the eye would probably degenerate, useful vision might persist for a considerable time. If signs of irritation did not abate, he would remove the eye. Foreign bodies in the cornea were often very troublesome to remove. When the foreign body was deeply embedded, he found a Beer's knife most useful. Mr. Lister went on to discuss, in some detail, functional cases, and quoted some striking instances. In head injuries, papillœdema occurred in slightly over 50% of the cases, but two-thirds of these had merely blurring or slight swelling. The greatest swelling occurred in association with cerebellar abscess. He did not attach much diagnostic importance to hemorrhages or exudations; and the presence of papillœdema did not point to the immediate necessity of operation; it was increasing swelling which was the significant factor. He regarded cases of occipital injury as of very great interest, as a study of them might cast important light on the cortical representation of the fundus. The facts arrived at by Dr. Gordon Holmes and himself from the examination of a number of cases, were: (1) when the lesion occurred over the occipital cortex of only one side, the result was either hemianopsia, or homonymous quadrantic defect on the opposite side; (2) when the bullet passed through both occipital lobes, there was at first complete blindness, but in several cases this gradually cleared centripetally after an interval varying from hours to days, leaving a central scotoma. He regretted his observations were not fuller, but cases were after a short time sent over to England.

The discussion was continued by Messrs. E. TREACHER COLLINS, P. H. ADAMS, G. POOLEY, CARGILL, MACKAY (Edinburgh), CRUISE, F. J. THOMAS, A. L. WHITEHEAD (Leeds), PRIESTLEY SMITH (Birmingham), TOWNSEND, COLONEL ELLIOTT, Mr. GRAY CLEGG, Professor LANDOLT, and the PRESIDENT.

THE NETTLESHIP MEDAL AND PRIZE.

At this sitting the Nettleship Medal and Prize were presented to Mr. E. Treacher Collins for his valuable work in the specialty of ophthalmology.

DISCUSSION ON DETACHMENT OF THE RETINA.

A debate on this subject was introduced by Mr. M. S. Mayou. He said that detachment of retina was only a sequel to other intraocular diseases. He dealt in the first place with its associated physical phenomena, and, secondly, with congenital detachment especially. The condition was really one of separation of the retina between the pigment-cell layer and the rods and cones, *i.e.*, where the two layers of the optic cup come together during fetal life, and which was subsequently represented as a lymph space. Detachment of retina was essentially a cystic condition. The author was strongly in agreement with von Graefe's view that it was exudative in origin, and that detachment could not occur without fluid being effused from the choroidal vessels, the fluid having a higher specific gravity than that in the vitreous chamber. It was probable that there was no true tissue adhesion between the rods and cones and pigment-cell layer, or at least so slight that it was not a factor in keeping the retina in its place. This potential space was filled with lymph, permitting the rapid tissue change associated with the bleaching and regeneration of the visual purple. In the normal eye, distention of the vitreous in its hyaloid was by fluid derived from the ciliary process; the vitreous exerted a pressure by having a higher density than the lymph in the interretinal space. In many diseases the vitreous became more fluid than normal, or the framework of the vitreous shrank with the hyaloid, and there was free fluid in the space between hyaloid and retina. With degeneration of the vitreous, the densities of the fluids on the two sides of the membrane closely approximated, and a slightly increased density of that in the interretinal space would produce detachment. For the investigation of such cases it was necessary to use a fixing agent which coagulated but did not destroy albumen,—and boiling was the best. It was very difficult to ascertain the underlying cause of shrinkage of vitreous. Detachment of retina occurred when a larger pressure was exerted outside than inside the membrane. Detachment could occur with a normal vitreous, as when the choroid was the seat of a growth. Owing to the effusion of albuminous fluid, the retina was pushed inwards, and some of the fluid was squeezed out of the connective-tissue meshes, passing forward into the anterior chamber. Glaucoma might supervene before the complete shrinking of the vitreous. Detached retina associated with growth in the choroid was exudative in character, though it might cause secondary changes in the vitreous. He detailed some cases in children who had come under his care. In myopia, a fluid exuded into the interretinal space of low density would cause detachment, possibly associated with venous obstruction. Inflammatory exudation from the choroid might cause detachment if of serous rather than plastic nature. Injuries might cause detachment, either with or without perforation of the globe. Fibrous bands in the vitreous he thought rarely caused detachment by contraction, though they might predispose to it by causing shrinkage and fluidity of vitreous. Cysts in the retina in its normal position might be of considerable size, and by bulging cause detachment on either side. Some of the cures of detachment he thought were probably due to evacuation of the fluid contents of these cysts. Congenital detachment was not usually recognized, as it occurred in microphthalmic eyes, and was not then seen clinically. Summarized, the author's contention was that the essential feature in congenital separation between the layers of the retina was distention of the primary optic vesicle with fluid, and that the fibrosis of the vitreous was of secondary development, not the cause of failure of union between the inner and outer layer.

Mr. LESLIE PATON, in continuing the discussion of detachment of the retina, pointed out that so long as the pathology of any disease was obscure, its treatment must be empirical, and frequently ineffectual. This was the present-day attitude in regard to detachment of retina, which was really a terminal effect. In cases of tumor of choroid, detachment was caused by accumulation of œdematous fluid behind the retina, this fluid being an irritative product. In some cases the cause was a perforating wound of the sclera, a case of which he quoted. Sometimes the detachment was due to a rapid exudation of lymph and serum into the subretinal space in severe choroiditis or general uveitis; or it might be caused by subretinal hemorrhage. He believed that detachment might occur from cicatricial contraction of the retina itself. From an examination of different types, he thought it safe to conclude that symptomatic detachment might arise from either a push from behind, a pull from inside, contraction of the retina, or a combination of any of these factors. He reminded the meeting of the main contentions of Raehlmann and Leber, and said that most cases of simple detachment occurred in myopes; he had found it to occur in all degrees of myopia, in which condition there was an increased cubical capacity of the scleral cavity. Vail, of Cincinnati, had shown that in myopes the circular ciliary muscle was usually atrophied from non-use, and that authority considered it part of a generalized atrophy of the ciliary body, with diminution of aqueous secretion and lowering of ocular tension. Mr. Paton then proceeded to discuss the question of sympathetic detachment, stating that he considered it a moot point as to whether it was really sympathetic, or whether the action was a setting up of a chronic cyclitis or uveitis in the sympathizing eye. He had had some cases of cure, *i. e.*, restoration of function, and he realized that spontaneous cure sometimes eventuated, though similar cases left alone had not got well, as had the cases in point after his treatment. In every case he thought all the facts should be placed before the patient, so that he could decide on whether he would have anything done, or not, especially as knowledge on the subject was not yet complete enough to enable a safe prognostication to be made in any particular instance.

The third opening paper was contributed by Dr. MAITLAND RAMSAY, who first reviewed the literary landmarks on the subject. He agreed with Mr. Paton that no theory of causation of detachment sufficed to account for all the cases; the underlying cause in all was disease of the uveal tract and of the pigment epithelium, though this might be nothing more than senile degeneration. The presence of a collection of fluid between the choroid and retina led to many forms of evacuation, which the author briefly indicated—thirty-eight in number. The most important factor in the treatment he considered to be absolute rest in bed; patients often volunteered the statement that they could see best in the morning after a good night's rest, but that sight failed as the day advanced. The rest period should not be less than four to six weeks. Relapses occurred most frequently in those who had rested but a short time. Every effort should also be made to improve the patient's well-being, particular attention being bestowed on procuring a regular action of bowels, kidneys, and skin. Next, the pressure bandage was important; both eyes should be covered and the pressure must be quite appreciable, though stopping short of pain. But where the bandage caused pain, and on its removal the eye was red and irritable, it should be discontinued, owing to the possibility of iridocyclitis supervening. Cases which did not bear the pressure bandage he regarded as of unfavorable prognosis. The third important factor of treatment was subconjunctival injections after forty-eight hours of bandaging, but only if the electric ophthalmoscope showed that the site and character of the detachment appeared favorable. The pain following the injections (which he detailed) was mitigated greatly by using chemically-pure chloride of sodium. Diaphoresis he did not employ until a fortnight's trial by his other methods showed little or no improvement. In some cases diaphoresis started an improvement which became slowly progressive. He used pilocarpine for this. There should be a period of leisurely recuperation afterwards; resumption of business immediately after cure seemed to invite relapse, and this was also helped by constipation. Failure was almost certain when the choroid was extensively diseased, when the pupils were sluggish in responding to mydriatics, and when intraocular tension was greatly reduced.

The debate was continued by Sir ANDERSON CRITCHETT, Bt., and Messrs. TREACHER COLLINS, CRUISE, J. B. LAWFORD, SYDNEY STEPHENSON, LEIGHTON DAVIES, MAXWELL, STOREY (Dublin), HIGGENS, MACKAY (Edinburgh), and the PRESIDENT. The authors replied.

At the clinical meeting, held at the Royal London Ophthalmic Hospital, the following cases were shown:

Mr. J. Gray Clegg: Case of **bullous keratitis** whose sister was similarly affected.

Mr. Sydney Stephenson: (1) A case and drawing to illustrate coarse striate clearing of a **corneal cicatrix.**

(2) A case of **blue sclerotics.**

Mr. C. Wray: (1) Cases operated on for **conical cornea.**

(2) Drawings of **cured conus.**

(3) **Exostosis of the orbit;** two cases.

Mr. E. Treacher Collins: Case of **congenital ectropion of both lower lids.**

Mr. Leslie Paton: Cases of **healed detachment of retina.**

Mr. Holmes Spicer: **Congenital cataract and spontaneous dislocation of lens** in three members of the same family.

Mr. Attlee: **Peripapular ectasia.**

Mr. Rayner Batten: **Collapsible periscope.**

Mr. W. H. H. Jessop: **Acute central retinitis.**

Mr. Pooley: **Extensive pigmented moles of face, eyelids, and conjunctiva.**

Mr. Treacher Collins: (1) **Double facial paralysis.**

(2) **Detached retina,** cured by rest in bed, with scleral puncture.

(3) **Aphakia with apparent accommodation.**

Mr. R. Foster Moore: (1) Two instances of disappearance of a **detachment of the retina in patients with albuminuria.**

(2) **Pigmented mole of rapid growth.**

Mr. Cyril Walker: **Hyaline bodies at the optic disk.**

Mr. Hudson: **Iridescent corneal scar.**

The President (Mr. F. Richardson Cross) read a paper on **Eye symptoms in Kaposi's disease (xerodermia pigmentosum).** In a general review of the disease he stated that spots like freckles appeared in the first year or two of life, and were often precursors of the grave skin disease described by Kaposi in 1870, accompanied by dryness and atrophy of the skin, and other serious changes. Frequently it affected more than one member of a family. The prognosis was very gloomy; early death might occur from deep ulceration towards the brain or other vital parts; or from exhaustion or hemorrhage. The muco-cutaneous surfaces, such as the eyelids, became thinned, shrunken, and fissured with superficial ulcers; and the eyeball might participate in any phase of the disease, and warts might occur on the lid edges. The ocular conjunctiva was usually hyperæmic. Some cases showed pterygium, and the cornea became hazy from infiltration of its substance or from swelling of the epithelium. Ectropion was frequently present, leading to opacity or ulcer of cornea. But in many cases the eyes were open, and light was well tolerated. The optic nerve and intraocular structures were affected only late, if at all. Massage of the eyeball, especially by the use of calomel ointment, served to empty the superficial blood-vessels. Dr. Whitfield had much improved one such case by applying X-rays. During the past year the author had had under observation two cases of Kaposi's disease, brother and sister, æt. 11 and 9½ years. The parents (cousins) were healthy. The boy was born in Ceylon, and when coming to England at nine months old he became very sunburnt in the Red Sea, his skin becoming scarlet. Later, face, neck, and shoulders were dotted with yellowish-brown pigment spots, and the skin became thin and shrunken. The girl was born in England, and arrived at Ceylon when a few months old; in her voyage she did not encounter excessive sunglare. At nine months of age her skin also became bad, and a little later a small nodule appeared on the cheek, but fell off, leaving no scar. She had implication of the eyelids, causing eversion. When four years old, the boy had a troublesome papule on the eye, for which he was treated by Sir John Tweedy, who reported that he first saw the patient in April, 1907, when he was under the care of the late Dr. Radcliffe Crocker for the skin condition. At that date there was subconjunctival ecchymosis at the outer side, and at the inner side of the globe, between the cornea and the caruncle, a truncated conical swelling with some ecchymosis and conjunctivitis. There was so much photophobia that a satisfactory view could not be obtained. On the following day, under a general anæsthetic, he examined the eye and found an indolent swelling in the conjunctiva and episclera at the inner side of the globe. He scraped it with a sharp spoon, and applied powdered salicylic acid, and ordered the eye to be washed two or three times a day with a solution of salicylate of soda. The eye gradually improved until the seat of the swelling presented the appearance of a small phlycten. Eighteen months later, when Sir John next saw the case, the eyes were much stronger, and were rarely inflamed. Two and a quarter years later the patient saw J. 2 with correcting glasses. When Mr. Cross saw the boy twelve months ago, he had much photophobia, both winter and summer, and when in the light he was constantly sneezing. He found it difficult to read. Under chloroform, there was found to be a dull hyperæmia of the eyeballs, and two small phlyctenular swellings. The corneæ were somewhat glassy; the pupils were small, but reacted to light, and opened freely to homatropine. A few days later he saw $\frac{6}{18}$ for a moment, and J. 6. Improvement was reported after massage of the eye with calomel ointment. In November there was acute inflammation of the right eye, with a fine infiltration running across the cornea. There was also a haziness of the left cornea, with a marginal spot looking like pterygium.

Mr. R. Affleck Greeves showed micro-photographs of sections through the conjunctival growth removed from the eye of a boy suffering from Kaposi's disease, mentioned by the President (Mr. Richardson Cross). The growth consisted, almost entirely, of epithelial cells, mainly prickle-cells, and showed evidence of commencing malignancy.

Mr. R. Affleck Greeves read a paper on the **microscopical anatomy of syphilis of the eye,** illustrated by micro-photographs of sections taken from three cases. In the first case, one of old interstitial keratitis, he pointed to the presence of persistent though empty endothelial channels in the cornea, the remains of former blood-vessels. The second case was one of gumma of the iris, the structure of which was peculiar in that the pigment epithelium had proliferated into the inflammatory tumor, and given clinically a pigmented appearance, causing to be made the erroneous diagnosis of melanosarcoma. The third case illustrated the pathological appearances of syphilitic scleritis and of a proliferative form of choroido-retinitis characterized by the presence of dense tissue between choroid and retina. This tissue, he considered, was probably produced by the proliferation of the retinal pigment epithelium.

Mr. Greeves also read a paper by Mr. G. Komoto on the **pathological anatomy of the retina and choroid after the**

complete and partial cutting off of their respective blood supplies. It was based upon the pathological examination of an eye which was excised ten days subsequent to the cutting off of the retinal and posterior choroidal blood supplies by the removal of a lymphangioma from the posterior part of the orbit, along with a portion of the optic nerve. While the retina was completely necrotic posteriorly, all its layers were well preserved anteriorly. The author argued, from this, that the whole of the anterior part of the retina is probably almost entirely dependent on the choroidal circulation. The chromatophores of the choroid and the pigment epithelium of the retina showed peculiar changes in form, caused by their being deprived of normal blood supply. The paper was illustrated by micro-photographs.

Mr. E. TREACHER COLLINS read a communication on **apparent accommodation with aphakia.** The case was described of a boy who had lamellar cataracts removed from his eyes when seven years old by repeated discission operations. When he was fourteen, it was discovered that he was using only one pair of glasses for both distance and reading. On testing his sight it was found that he saw: right, c plus 13 $\frac{6}{6}$ths; left, c plus 13$\frac{6}{9}$ths; and with the same glasses in the same position on his nose, looking straight through the centre of them, he read J. 1 fluently. Any alteration in curvature of the cornea while he adapted his eye for the near point was excluded by examination with the ophthalmometer, and by the use of Hatten's eye-bath. Any lengthening of the antero-posterior axis of the globe was watched for by ophthalmoscopic examination. He could see just the same when the eyelids were held away from contact with the globe. When the pupils were semi-dilated with cocaine, he could still read J. 1 with plus 13 in ordinary daylight with the right; but only J. 2 with the left. When the pupils were fully dilated with atropine he could read only J. 10 with plus 13 in ordinary daylight; but in the dark room with a strong light concentrated on the test-type he still read J. 1, better with the right eye than with the left. When examined with the pupils well dilated, it was seen that in the right eye there was a membrane with a sharply defined central aperture in it, 3.5*mm* in diameter. In the left eye the aperture was larger and more oval in shape; the membrane in it, moreover, did not occupy the entire pupillary area; a space being left at the circumference between it and the pupillary margin. Both pupils were regular, free from any adhesions, and acted very briskly to light. The author considered that the evidence he had collected in connection with this case went to show that there was not any true accommodation; that the boy's power of seeing clearly at different distances was due to the cutting off of circles of diffusion, partly by the contraction of the pupils, but mainly by the small central openings in the membranes. He quoted several other cases which had been recorded, in which apparent accommodation was present after the removal of the lens; and advocated trying to adapt the technique in operations for soft cataract so as to produce a condition similar to that in the case here described.

Mr. TREACHER COLLINS described a case in which an **epibulbar epithelioma completely disappeared after the application of radium bromide.** A man, æt. 80, had a new growth about 10*mm* in diameter at the limbus in his left eye. It had formed in two years, and was gradually increasing in size. A small piece was cut off, and microscopical examination of it showed it to be an epithelial growth, which was extending into and infiltrating the episcleral areolar tissue. At the Radium Institute the patient had 10*mg* of radium bromide on a circular disk 1*cm* in diameter, unscreened; it was held continuously over the growth for fifty minutes by a relay of assistants. After this, the growth gradually disappeared. At the end of a fortnight only a thickening at the margins was left. It was now five months since the treatment, and all that could now be seen at the site was a smooth grayish scar. The way in which epibulbar epitheliomatous growths permeate the lymphatic channels and spaces in and about the eye was then demonstrated by a series of lantern slides. It was shown how, for a long time, the sclerotic resisted such permeation and the growths remained superficial, and while this stage lasted they would be eminently amenable to treatment by radium.

Mr. J. GRAY CLEGG (Manchester) read four communications. The first was on **dystrophies of the cornea and glaucoma,** with especial reference to a familial variety of the former. Changes in the cornea occurred which resembled those found in glaucoma, but there was no tension element. Two sisters in a family of three were shown, all affected by the disease, which probably existed in at least one other relative. Another case was related in which similar changes were present; but as there was a doubtful tension element, iridectomy had been done in one eye, and trephining in the other, without any beneficial effect on the corneæ.

The second paper was on **primary pneumococcal acute choroiditis.** The disease occurred in a healthy male, æt. 27. It affected the right eye, which had been previously examined, and found healthy. At first the appearances were considered by three oculists to be those of tubercle, consisting of two blurry yellowish-white foci at the macula. In spite of treatment, an acute panophthalmitis developed, and twenty-nine days after being first seen, a Mules operation was performed. A specimen taken at the operation showed a pure culture of the pneumococcus of Friedländer.

The third paper was on a method of **artificial maturation of cataract allowing of early extraction.** The method was, briefly, as follows. The night prior to operation the pupil was well dilated with atropine, and paracentesis was performed with an iris knife. Massage was applied directly to the lens capsule by a smooth iris repositor, and this was followed by indirect massage by the back of a lens scoop. Atropine was again instilled. If no irritation resulted, no more atropine was used after the day of operation. Often within a week the eye was perfectly quiet, the pupil returned to its ordinary size, and regained its activity. Extraction could then be resorted to, either without or with iridectomy. In this way the whole process could, in many cases, be gone through in three weeks, to recovery.

The last paper described a case of **sarcoma of the socket.** The patient had already had his left eye removed, and was wearing an artificial eye. About August, 1910, it would not keep in position, owing to the presence of a pediculated growth towards the outer part of the socket. The mass was excised, but in November, 1910, it recurred. A section of the original growth raised suspicions of malignancy, and a few days later the lid margin, with the conjunctiva and the whole contents of the orbit, was removed. There was no recurrence. The structure, as described by Professor Walker Hall, was suggestive of perithelioma. Possibly the tumor was caused by a fine crack in the artificial eye which he had been wearing.

Mr. W. B. INGLIS POLLOCK (Glasgow) read a paper on **dissolving senile cataract** in the early stages. In a consecutive series of one hundred patients with senile cataract who were under treatment for not less than three months with alkaline lotions and dionine fibrolysin and iodolysin drops, 45% of the 178 eyes showed great improvement, and 41% an improvement in vision; 7% remained stationary. In 8% the treatment failed to arrest the progress of the cataract. The method did not cause pain, and could be persevered with over long periods. Attention should be directed to the general health, and the internal administration of an alkali was an advantage. Several patients had, he said, remained free of recurrence for a period of from three to six years.

Colonel HERBERT read a communication on the **capsular opacities of Morgagnian cataract**. He showed photo-micrographs of the capsule of a very long-standing cataractous lens, which had passed beyond the Morgagnian stage. The capsule showed scattered white dots clinically. Under the microscope these were found to consist of spaces formed between layers of thickened capsule, and containing, mainly, lens débris, similar to the "milk" of the cataractous lens. Reasons were given for supposing that similar changes may account for the globules or clear rings of after-cataract. And reference was made to two processes at work, singly or together, in senile cataract: the one, representing simply deficient nutrition, resulted eventually in an abnormally dry shrunken lens. The other, apparently due largely to destruction of the lens cells lining the capsule, consisted essentially in undue admission of aqueous into the lens, and its results.

QUARTERLY REVIEW OF THE PROGRESS OF OPHTHALMOLOGY.

By H. Koellner, Berlin; W. Krauss, Marburg; R. Kümmell, Erlangen; W. Loehlein, Greifswald; H. Meyer, Brandenburg; W. Nicolai, Berlin; H. Pagenstecher, Strassburg; K. Wessely, Würzburg; and M. Wolfrum, Leipsic, with the Assistance of Drs. Alling, New Haven; Calderaro, Rome; Causé, Mayence; Danis, Brussels; Gilbert, Munich; Groenholm, Helsingfors; v. Poppen, Petrograd; Treutler, Dresden; and Visser, Amsterdam.

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THIRD AND FOURTH QUARTERS, 1914.

(*Continued from page 479.*)

XII.—ORBITS, EXOPHTHALMOS, ACCESSORY SINUSES.

69. Cecchetto. **Exophthalmos from gumma of the superior rectus.** *Annali di Ottalm*, f. 11–13, 1913.

70. Clegg, J. Gray. **A case of orbital cellulitis produced by ethmoidal sinusitis. Purulent meningitis. Death.** *Med. Chronicle*, p. 17.

71. Cramer, E. **Bony tumors of the orbit.** *Klin. Monatsbl. f. Augenheilk.*, July–August, 1914, p. 147.

72. Fuchs. **Myxoma orbitæ.** *Zeitschr. f. Augenheilkunde*, **xxxii.**, p. 192.

73. Roessler, F. **Orbital abscess with atrophy and pigmentation of the optic nerve after dacryocystitis.** *Kl. Monatsbl. f. Augenh.*, September, p. 383.

74. Zani, D. **An unusual syndrome of syphilitic osteoperiostitis of the orbit.** *Annali di Ottalm*, f. 11–12, 1913.

Cecchetto (69, **Exophthalmos from a gumma of the superior rectus**) reports the case of a man 35 years old, who had suffered for some days from supraorbital neuralgia and ptosis of the left eye, which very soon passed into a total ophthalmoplegia with a well-marked exophthalmos. Wassermann was positive. Large doses of iodide of sodium, together with three injections of salvarsan, produced a complete recovery within two months.

CALDERARO.

ZANI (74, **Unusual syndrome of syphilitic osteoperiostitis of the orbit**) reports a case of this nature that appeared during the secondary period in a man 39 years old at the apex of his right orbit. The involvement of the ophthalmic branch of the trigeminus was shown by the anæsthesia of the corresponding region. The abducens and motoroculi also were involved, with the exception of the branch to the levator of the last. Consequently the eye was turned far inwards, was immovable, and was slightly exophthalmic. An extensive leucoma prevented an examination of the fundus. Improvement took place under specific treatment.

CALDERARO.

CLEGG (70, **Orbital cellulitis from ethmoiditis**) reports the case of a girl 19 years old who was suddenly seized with headache and vomiting. Two days later exophthalmos set in with a great œdema of the lids and impairment of vision to perception of light. The temperature and pulse remained normal. Drainage of the orbit produced a brief improvement, but death ensued on the fourth day from acute meningitis. The pus, both that from the orbit and that from the meninges, contained streptococci.

ROESSLER'S (73, **Orbital abscess after dacryocystitis**) patient had had dacryocystitis for thirty years, and had had the duct probed once, twenty-five years before. A week before coming under observation the eye became swollen and painful, and the next day was blind. When seen the lids and the region of the lacrimal sac were tensely swollen, the eyeball was injected and chemotic, exophthalmic and immovable, the pupil widely dilated and not responsive to light. The retina was cloudy, the papilla hazy, the veins tortuous and much dilated, the arteries narrow. Pus was evacuated from the orbit through incisions. The inflammatory symptoms gradually abated, leaving the papilla white, with some granular pigmentation. His explanation of the possible cause of the pigmentation may be correct or it may not.

FUCHS (72, **Myxoma orbitæ**) removed from the orbit of a woman 40 years old, after extirpation of the lacrimal gland and section of the external rectus an encapsulated tumor one and a half times as large as the eyeball which proved under the microscope to be a myxoma. Recovery with perfect vision followed the operation.

CRAMER (71, **Bony tumors of the orbit**) found a globular piece of bone, without periosteum, in the nasal part of the orbit, laid it bare, and removed it easily with a pair of forceps. Further dissection beneath the site of the growth caused the sudden evacuation of a large quantity of a black, watery, slightly mucous fluid. Whether this was a dermoid or not could not be determined satisfactorily.

XIII.—CONJUNCTIVA.

75. BEARD, C. H. **A new operation for the removal of true and false pterygium or other growths at the sclerocorneal junction.** *Trans. American Ophthalmological Society*, 1914.

76. BEDELL, A. J. **A case of chronic sporotrichosis of the eye.** *Ibid.*

77. CECCHETTO, E. **Nontoxic antigonococcus vaccine in the treatment of gonorrheal conjunctivitis.** *Annali di Ottalm.*, f. 1–2, 1914.

78. COLOMBO, G. L. **Cystic formations and amyloid degeneration of the conjunctiva.** *La clin. oculist.*, January–February, 1914.

79. ELY, C. F. **Samoan conjunctivitis.** *Ophthalmic Record*, September, 1914.

80. HARSTON. **The treatment of trachoma by CO_2 snow.** *Ophthalmoscope*, November, 1914.

81. KOMOTO, G. **A hitherto unknown tumor of the conjunctiva.** *Klin. Monatsbl. f. Augenheilkunde*, July–August, 1914, p. 136.

82. LOEHLEIN. **Amyloid degeneration of the conjunctiva.** *Med. Verein Greifswald*, May 22, 1914.

83. PAPACCONE, E. **Trachoma corpuscles.** *Arch. di Ottalm.*, February, 1914.

84. PUSCARIU, ELENA. **Treatment of gonorrheal conjunctivitis with ethylhydrocuprein.** *Cpt. rend. hebdom. des séances de la soc. de biol.*, lxxvi., p. 831.

85. RANDOLPH, R. L. **Melanosis of the conjunctiva. Report of a case.** *Transactions American Ophthalmological Society*, 1914.

86. STREIFF, J. **Methodical examination of the circulation of the blood near the margin of the cornea.** *Klin. Monats. f. Augenh.*, September, 1914, p. 395.

87. VAIL, D. T. **A case of squirrel-plague conjunctivitis in man.** *Ophthalmic Record*, October, 1914.

STREIFF (86, **Methodical examination of the circulation of the blood near the margin of the cornea**) claims that such a methodical study of the circulation in this situation is of clinical advantage. Any compression of the conjunctival vessels by the lids, or a prolonged concentration of light upon one spot is to be avoided carefully. If by means of a powerful lens a distinctly granular current, with occasional interruptions of the red blood column, can be seen in the conjunctival vessels, the circulation is slowed pathologically. The cause may be found in local changes in the vessels, or in general disturbances of the circulation. Such changes in the circulation in the conjunctival vessels are frequently the first manifest signs of abnormal conditions in the peripheral vascular system. If they are numerous in the neighborhood of the upper or lower margin of the cornea, their pathognomonic signification is not to be doubted. Aneurysmic dilatations are not uncommon after syphilis, but it is questionable whether they occur in ordinary senile sclerosis. Differences in caliber, miliary aneurysms, or varicose dilatations are to be seen in kidney disease, diabetes, gout, anæmia, and cachexia. The writer lays special weight on certain changes of the circulation in the limbus. In characteristic cases a great, but very uneven, distention of concentric anastomoses may be seen in the limbus capillaries, in addition to the granular current, the uneven filling of the vessels, and the differences of caliber; this indicates circulatory troubles in the eye itself, especially in the anterior portion of the choroid and in the ciliary body.

PUSCARIU (84, **Treatment of gonorrheal conjunctivitis with ethylhydrocuprein**) reports excellent results from the use of this preparation, otherwise known as optochin, in the treatment of eight cases of ophthalmia neonatorum. The corneal ulcers seemed to be affected favorably.

CECCHETTO (77, **Nontoxic antigonococcus vaccine in the treatment of gonorrheal conjunctivitis**) reports three cases, two of infants and one of an adult, in which the subcutaneous injection of the vaccine in the lower lid produced a distinct effect upon the course of the disease, as the gonococci disappeared from the conjunctival secretion.

CALDERARO.

ELY (79, **Samoan conjunctivitis**) describes a virulent endemic form of acute conjunctivitis very prevalent in Samoa, which is caused by a small Gram negative micrococcus somewhat resembling the gonococcus. It however grows well on the usual culture media. It responds readily to treatment but if neglected leads to corneal ulceration and complications.

ALLING.

A plague-like disease which was at first thought to be identical with bubonic plague was discovered among the ground squirrels of California in 1900. It was later shown to be due to a different organism. VAIL (87, **Squirrel-plague conjunctivitis**) reports a case of a butcher who developed a severe conjunctivitis with deep round ulcers and enlarged preauricular, submaxillary, and cervical glands and a dacryocystitis. Scrapings from the conjunctival ulcers were used in animal inoculations and complete bacteriological studies made. The conclusion reached was that the organism was Bacillus tularense and identical with that producing squirrel plague. It is believed that the patient entirely recovered.

ALLING.

BEDELL'S (76, **Chronic sporotrichosis of the eye**) case was a man of 49 who had had a mild purulent conjunctivitis for two years. Complete recovery took place in about two months under treatment with KI internally and the removal of five concretions from the lacrimal sac. Ocular sporotrichial infection has been noted twice before in the United States.

ALLING.

HARSTON (80, **The treatment of trachoma by CO_2 snow**) has successfully treated seven thousand cases of trachoma in China with CO_2 snow and considers that it constitutes the most rapid method of cure of trachoma, especially when employed with other recognized methods. He applies the snow pencil with firm pressure horizontally to the everted lids for fifteen seconds for the first time and at subsequent sittings for thirty seconds. Applications are made from ten to fourteen days apart. He finds no excessive scarring, and thinks that found in other clinics may be due to applications at too short intervals. Cases with much papillary overgrowth require longer to cure and in these cases there is a liability to excessive scarring, but he advocates fourteen-day intervals for applications, with firm and prolonged pressure. In some cases he has applied it as long as forty seconds. He attributes the good results to the hyperæmia produced.

CURRAN.

Papaccone (83, **Trachoma corpuscles**) found typical trachoma corpuscles only in trachoma, and in twenty-three out of sixty cases observed. In other cases, vernal conjunctivitis, catarrhal and purulent conjunctivitis, he found inclusions which resembled these corpuscles, but could be differentiated from them. Corpuscles were rarely seen in cases that had been treated already. He agrees with Provaczek in believing them to be protozoa.

Calderaro.

Colombo (78, **Cysts and amyloid degeneration of the conjunctiva**) is of the opinion that the primary cause of conjunctival cysts is an inflammatory change of the conjunctiva that produces a functional or anatomical change of the gland or of the tissue surrounding it, which gives rise to the formation of a cyst. He describes a cyst of one of Krause's glands through occlusion of its duct, and an extraordinary case of enormous amyloid degeneration of the conjunctiva taking the combined form of a tumor and of a cyst.

Calderaro.

Loehlein (82, **Amyloid degeneration of the conjunctiva**) describes a case of this nature in a patient who had no signs of trachoma. The degeneration affected only the upper lid. The epithelial covering was shown microscopically to be intact, while the adenoid tissue was densely infiltrated. The small vessels showed marked homogeneous thickenings of their walls, which completely filled the lumen of some.

Koellner.

Komoto (81, **Tumor of the conjunctiva**) removed a tumor from the transition fold of the conjunctiva and found in it masses of mulberry-like, globular, homogeneous balls, that glistened like hyalin, partly intracellular, partly extracellular, the so-called Russell's corpuscles. He therefore named it Russell's corpuscle tumor. Histologically it presented the picture of pseudotuberculosis, and it was probably caused by the irritation of a foreign body. The corpuscles were found both in the plasma cells in which they originate, and in the epithelioid cells, which come from the plasma cells. Contrary to other products of hyaline degeneration they have a marked affinity for the picric acid in van Gieson's stain.

Randolph's (85, **Melanosis of the conjunctiva**) case showed three patches of pigment in the lower conjunctival sac. The caruncle was also deep black. In the other eye there was a small patch of pigment in the lower conjunctival sac and the caruncle was partially pigmented. The condition was apparently congenital.

ALLING.

BEARD'S (75, **Operation for pterygium**) operation differs little from well-known methods except in the fact that he cuts off only the head of the pterygium and pushes the remaining neck and base back toward the caruncle. The bared area is covered with sliding conjunctival flaps from above and below. Each of these flaps contains a portion of the upper and lower side of the pterygium which he leaves in making the first two horizontal incisions.

ALLING.

XIV.—CORNEA AND SCLERA.

88. ALESSANDRO, P. **Histological observations and histogenetical considerations concerning a case of primary epithelioma of the cornea.** *La clin. oculist.*, March–April, 1914.

89. ANTONELLI, A. **The oval cornea of hereditary syphilis.** *Revista Ital. di Ottalm.*, 1913.

90. BELL, G. H. **Report of a case of tuberculosis of the sclera of probable primary origin.** *Trans. American Ophthalmological Society*, 1914.

91. BIELSCHOWSKY. **Treatment of purulent ulcers of the cornea.** *Aerztl. Verein*, Marburg, May 24, 1914.

92. DUTOIT, A. **Observation of a case of keratitis neuroparalytica consequent upon injection of alcohol into the superior maxillary nerve for facial neuralgia.** *Zeitschrift f. Augenheilkunde*, July, p. 26.

93. GOLDSCHMIDT. **Chemotherapy of penumococcal diseases of the eye, especially of ulcus serpens with optochin ointment.** *Muenchener medizinisch Wochenschrift*, No. 27.

94. HARDY, W. F. **Parenchymatous keratitis in acquired lues.** *American Journal of Ophthalmology*, November, 1914.

95. LIBBY, G. F. **Acquired symmetrical opacities of the cornea of unusual type.** *Transactions American Ophthalmological Society*, 1914.

96. TIFFANY, F. B. **New operation for conical cornea.** *Ophth. Rec.*, August.

97. UHTHOFF, W. **A case of chronic tuberculous (?) keratitis.** *Klin. Monatsbl. f. Augenheilkunde*, July–August, 1914, p. 230.

98. UHTHOFF, W. **A case of typical ulcus corneæ rodens (Mooren) in both eyes.** *Ibid.*, p. 229.

99. ZEIGLER, S. L. **Trefoil or stellate keratectomy for anterior staphyloma.** *Journal A. M. A.*, September 5, 1914.

Libby (95, **Acquired symmetrical opacities of the cornea**) describes a case which had a symmetrical yellowish white opacity about 5*mm* in diameter on the nasal half of each cornea. The growth was subepithelial and the substantia propria was deeply invaded. The condition had existed about four years and no cause could be assigned. The case seems to be unique but probably belongs to the group known as family degeneration of the cornea.

Alling.

Antonelli (89, **The oval cornea of hereditary syphilis**) finds that the vertical diameter of the cornea is from 1 to 1½*mm* longer than the horizontal in persons who have suffered from interstitial keratitis. The developmental anomaly is frequent with the microcornea and blue sclera associated with hereditary syphilis. He ascribes both the oval cornea and the blue sclerotic to an inhibition of development.

Calderaro.

Dutoit's (92, **Neuroparalytic keratitis after injection of alcohol into the superior maxillary nerve**) patient, 40 years old, had suffered for four months from neuralgia of the superior maxillary nerve, which had involved the ophthalmic nerve for a month. Other treatment failing alcohol was injected into the nerve in the pterygomaxillary fossa. The neuralgic pain in this nerve disappeared immediately, but four days later neuroparalytic keratitis appeared, superficial loss of substance, cloudiness of the parenchyma, and absolute anæsthesia of the cornea. The ulceration healed under the influence of dionin in sixteen days, sensitiveness returned to the cornea sooner. Three weeks later alcohol was injected into the ophthalmic nerve because of the neuralgia that persisted there. This was followed quickly by an œdematous swelling of the lid which disappeared completely in a week. The neuralgia was cured. The right eye showed no pathological changes.

Uhthoff (97, **Chronic tuberculous (?) keratitis**) reports a case in which a keratitis lasted four years and led finally to a broad, horizontal opacity in the part of the cornea lying in the palpebral fissure. The process was checked by an iridectomy. Wassermann was positive, but became negative under energetic antisyphilitic treatment. Then the other eye became affected by deep grayish infiltrates in the region of the palpebral fissure, especially near the outer limbus, resembling fascicular keratitis except that the infiltrates were deeper in the cornea. Some signs of old pulmonary tuberculosis led to treatment with tuberculin, which seemed to exert a good influence. He thinks that tuberculosis was probably at the bottom of the trouble.

HARDY (94, **Parenchymatous keratitis in acquired lues**) saw the case of a boy of 17 who showed no marks of hereditary syphilis but the history of an acquired lesion. The disease ran a typical course. If the patient had hereditary lues he must have been cured of it, for only under these conditions could he have contracted syphilis.

ALLING.

BIELSCHOWSKY (91, **Treatment of purulent ulcers of the cornea**) says that while by the old methods of treatment fourteen eyes out of thirty-six suffering from serpiginous ulcer were functionally lost, the results in twenty-three treated with optochin have been excellent, seventeen recovering with a vision of more than $\frac{1}{10}$. Instillations of a 1% solution, or subconjunctival injections of a ½% solution, were employed.

KOELLNER.

According to GOLDSCHMIDT (93, **Chemotherapy of pneumococcal diseases of the eye**), optochinum hydrochloricum is a preparation that meets every indication for a chemotherapeutic remedy. The pneumococcus is particularly affected by it. The treatment must be as intensive as possible from the start, and five or six applications are necessary during the day. He prefers a 1% ointment. The eye should be cocainized before the first application. From one to three days are generally necessary for the cleansing of the ulcer. In about a hundred cases he has never seen any progression or reinfection. The treatment takes longer when the ulcers are associated with deep infiltrates. Abscess of the lacrimal sac and pneumococcal conjunctivitis are also influenced well by it.

UHTHOFF (98, **Ulcus rodens**) reports a typical case. The patient, 50 years old, had suffered from attacks of inflammation of his left eye for nine years, of his right for three. The attacks usually came on in May and lasted six weeks. The chronic ulcerative process had involved about three-fourths of the surface of both corneæ. The boundary between the healthy and diseased parts was marked by a yellowish gray, somewhat undermined, sharp line, which advanced slowly in each successive attack. The diseased part was grayish, opaque, and very vascular, with superficial defects, but not materially ectatic. The dense, very vascular connective-tissue proliferation showed a tendency to bleed.

The microscopical examination of a tumor by ALESSANDRO (88, **Epithelioma of the cornea**) which presented all the characteristics of a primary epithelioma of the cornea showed a distinct multiplication of cells by mitosis, amitosis, atypical mitosis, fragmentation, etc., both in the epithelium and in the connective-tissue stroma, to which the increase of the neoplasm was to be ascribed exclusively. An epithelial tumor, and malignant tumors in general, may be defined as an abnormal excess of the function of reproduction of the pre-existing histological elements. The special proliferative activity of many epithelial cells furnishes us the true explanation of the pathogenesis of epithelial pearls. The necrobiosis, which presented characteristics as though tending to hyaline degeneration, explains the small size of the tumor, the frequency of hemorrhages, and the epitheliomatous ulcers.

CALDERARO.

TIFFANY (96, **New operation for conical cornea**) suggests trephining at the sclerocorneal junction and making a small peripheral iridotomy apparently under the impression that the progress of this disease is due to high intraocular pressure. He has operated upon one case.

ALLING.

ZEIGLER (99, **Trefoil or stellate keratectomy for anterior staphyloma**) advocates the removal of a portion of the staphyloma of the cornea in the form of three- or four-leaved flaps, depending on the size of the protrusion. He uses either scissors or punch to make the leaf-like excisions. He reports three cases in which the corneal curve was restored.

ALLING.

BELL'S (90, **Tuberculosis of the sclera**) case showed two or three definite nodules. Positive reaction to tuberculin both local and general proved the character of the lesion. In spite of the therapeutic administration of tuberculin the case extended over a long period, but with final recovery. Absence of other tuberculous lesions in the body leads him to the conclusion that the process was primary.

ALLING.

XV.—IRIS AND PUPILS.

100. OLOFF. **Myotonic convergence reaction of the pupils.** *Klin. Monatsbl. f. Augenheilkunde*, October–December, p. 516.

101. SALA. **Histopathology of the ciliary ganglion. Contribution to the understanding of the Argyll-Robertson phenomenon.** *Med.-chir. Gesellsch.*, Pavia, February 6, 1914.

OLOFF (100, **Myotonic convergence reaction of the pupils**) describes two cases of this nature. There were differences between the pupils and the well-known disturbance of reaction on one side, and almost lost reaction to light. There was no disturbance of the accommodation or of the iris. Generally these cases are post-traumatic, but in these two the cause was probably central.

SALA (101, **Histopathology of the ciliary ganglion**) found in paralytics a sharply limited disease of the nerve cells whose axis-cylinders pass into the short ciliary nerves. The changes were both degenerative and regenerative, and are to be found regularly in paralytics with reflex immobility of the pupil.

XVI.—LENS.

102. FLEISCHER. **Lenticular myopia from too small and too much curved lenses with glaucoma.** *Klin. Monatsbl. f. Augenheilk.*, September, p. 433.

103. HANSELL, H. F., and SHANNON, C. E. G. **Preliminary capsulotomy in the operation for the extraction of immature cataract.** *Trans. American Ophthalmological Society*, 1914.

104. HESCHELER. **Tetany cataract.** *Med. Gesellsch. zu Kiel.*, May 11, 1914.

105. SMITH. **The treatment of the earlier stages of senile cataract.** *Ophthalmoscope*, September, 1914.

106. TOOKE, F. **The pathology of the corneal section and its complications in cataract extraction.** *Trans. Amer. Ophthalm. Society*, 1914.

107. VAIL. **Delayed healing of the wound in cataract extraction and its proper treatment.** *Ophthalmoscope*, August, 1914.

HESCHELER (104, **Tetany cataract**) found only one case of latent tetany among fifty patients with senile and presenile cataract.

Tooke (106, **Pathology of the corneal section**) asserts that after the coagulation of fibrin between the lips of the wound the healing begins through the middle of posterior fibers of the substantia propria and that the corneal epithelium rapidly grows into the triangular space thus left along the outer side. Descemet's membrane he believes never unites. Experiments on rabbits confirm him in this opinion. Infection through a cystoid cicatrix after trephining or corneal section is due to thinning of the conjunctiva and to the fact that bacteria are known to involve the subconjunctival tissue as well as the superficial epithelium. In prolapse of the iris the anterior surface is fused with the edges of the wound and rapidly covered with epithelium. Later connective tissue flattens the iris knuckle. Lens matter and capsule tend to increase the danger of entrance of bacteria. Regarding keratitis striata, he is inclined to attribute this condition fundamentally to senile changes in the endothelium and Descemet's membrane, which permit access of aqueous after the disturbance produced by operative procedures. Alling.

Vail (107, **Delayed healing of the wound in cataract extraction and its proper treatment**) believes that a frequent cause of delayed healing is spasm of the orbicularis palpebrarum, and he has in three cases successfully tried severing the orbicularis from its attachment, cutting at right angles to the palpebral fissure. It produces no deformity. He recommends this operation in cases of cystoid scar beginning to form also.

Curran.

Hansell and Shannon (103, **Preliminary capsulotomy for immature cataract**) have done the Homer Smith operation seventeen times. They have, however, left an interval of twenty-four hours instead of six as recommended and have made a V-shaped incision in place of a cross. In a few cases the operation did not result in complete removal of the lens which is its only object, hence the authors are unwilling from their experience to express a definite opinion as to its value.

Alling.

Smith (105, **The treatment of the earlier stages of senile cataract**) divided the earlier stages of senile cataract into two classes: first, the stage we can treat without operation; and second, the stage in which operation is necessary.

In the first stage, the first symptom the patient complains of is failure for distant vision; there is no complaint on near vision. In the very earliest stages no opacity can be seen in the lens, but the fundus is seen as if under dull illumination. If in such a case the vision is reduced to $^6/_8$ or $^6/_{10}$, Smith gives twenty-five minims of one in four thousand to one in six thousand solution of cyanide of mercury, injected under the conjunctiva. In a month the patient usually comes back with $^6/_6$ vision.

In the second class of earlier cataracts, Smith argues for his intracapsule method of extraction. He has done many cases in European patients and finds no difference from those of India.

CURRAN.

FLEISCHER (102, **Lenticular myopia**) found in two members of the same family a myopia of 10 and 12 dioptres produced by the great curvature of abnormally small lenses. Two older members of the family had glaucoma, signs of which were also present in the ones first mentioned.

XVII.—VITREOUS AND CHOROID.

108. BERG. **Preretinal sarcoma of the choroid. Early perforation of the undetached retina.** *Klin. Monatsbl. f. Augenheilkunde*, July–August, p. 115.

109. BETTI. **A pathogenic variety of proteus isolated from an atypical panophthalmitis.** *Annali di Ottalm.*, f. 11–12, 1913.

110. KOYANAGI. **The infiltration of leucocytes in the choroid in leucocythæmia.** *Klin. Monatsbl. f. Augenheilkunde*, July–August, p. 152.

BETTI (109, **Pathogenic variety of proteus isolated from an atypical panophthalmitis**) reports the case of a woman 72 years old who had a panophthalmitis in one eye with destruction of the cornea and expulsion of the lens, but with little reaction on the part of the conjunctiva. A pathogenic variety of proteus was isolated from the thick pus which proved able to reproduce in animals the characteristic form of disease. On account of its morphological character, the manifestations of its biochemical action, and the injuries it inflicted on animals, the isolated micro-organism is looked upon as a hitherto undescribed variety of the proteus vulgaris of Hauser, to which it is related. This is one of the few cases in which the proteus has been recognized as the only and certain cause of disease in man.

CALDERARO.

BERG (108, **Preretinal sarcoma of the choroid**) describes a case in which the tumor did not detach the retina, as it usually does, but perforated it and then proliferated freely into the vitreous.

KOYANAGI (110, **Infiltration of leucocytes into the choroid in leucocythæmia**) describes three cases of leucocythæmia with changes in the eye. The first was one of myeloid leucocythæmia with marked distention of the choroidal and retinal vessels, but without material infiltration of the stroma. The second was one of lymphatic leucocythæmia in which the choroid was densely infiltrated with small lymphocytes, while large ones were prominent in the blood. The choriocapillaris and retina were left free. The third was one of lymphatic leucocythæmia in which the choroid was densely infiltrated with large lymphocytes.

XVIII.—SYMPATHETIC OPHTHALMIA.

111. GIFFORD, H. **On the treatment of sympathetic ophthalmia with atophan or novatophan.** *Ophthalmic Record*, July, 1914.

112. JAMPOLSKY. **Sympathetic ophthalmia after enucleation.** *Zeitschr. f. Augenheilkunde*, September–October, p. 233.

GIFFORD (111, **Treatment of sympathetic ophthalmia with atophan or novatophan**) has used atophan as a substitute for salicylates, and was favorably impressed with its action in twenty cases of iritis, and especially in four cases of sympathetic ophthalmia.

ALLING.

JAMPOLSKY (112, **Sympathetic ophthalmia after enucleation**) reports eight cases of sympathetic ophthalmia in which the onset took place from three to thirty-eight days after enucleation. Five recovered with good vision. The interval that may elapse between the enucleation and the outbreak of the disease is uncertain.

XIX.—GLAUCOMA.

113. BUTLER, T. HARRISON. **Holth's punch operation for glaucoma.** *Ophthalmoscope*, June, 1914.

114. CALHOUN, F. P. **Hereditary glaucoma (simplex). The report**

with operative notes of three generations of one family. *Jour. A. M. A.*, July 18, 1914.

115. Collins, Treacher. **The sclerocorneal trephining operation for glaucoma.** *Ophthalmoscope*, October, 1914.

116. Evans and Butler. **The result of modern glaucoma operations.** *Ophthalmoscope*, August, 1914.

117. Gjessing. **Acute attack of glaucoma excited by the instillation of holocain and zinc.** *Klin. Monatsbl. f. Augenheilkunde*, September, p. 379.

118. Guglianetti, L. **Sclerocorneal trephining (Elliot's operation) in the treatment of glaucoma.** *Arch. di Ottalm*, February, 1914.

119. Parker, W. R. **Sclerocorneal trephining for glaucoma.** *Journal A. M. A.*, July 18, 1914.

120. Posey, W. C. **The value of myotics in chronic glaucoma.** *Ibid.*, July 18th.

121. Quackenboss, A. **Sclerocorneal trephining for glaucoma. Complications and failures in one hundred cases.** *Trans. Amer. Oph. Society*, 1914.

122. Reber, Wendell. **Report on twenty-six sclerocorneal trephinings (Elliot's operation) for glaucoma.** *Ophthalmoscope*, April and May, 1914.

123. Verderame, F. **Sclerochoroiditis and serous cyclitis with increase of tension.** *Annali di Ottalm*, f. 11–12, 1913.

124. Vossius. **Report of the cases of glaucoma operated on according to Elliot in the clinic at Giessen.** *Klin. Monatsbl. f. Augenh.*, July–August, p. 221.

125. Young, George. **Decompression in glaucoma.** *Ophthalmoscope*, April.

Gjessing (117, **Glaucoma excited by holocain and zinc**) observed an attack of glaucoma after the instillation of these drugs, and is inclined to hold them responsible.

Calhoun (114, **Hereditary glaucoma**) states that a case of glaucoma simplex in one under thirty should arouse suspicions of hereditary influence. He thinks that smallness of the cornea and globe play an unimportant part. General disease other than gout and rheumatism has little to do with causation. The liability to transmission by the two sexes seems about equal. The male sex shows a greater tendency to inheritance. Out of sixteen individuals in one family, eight had glaucoma and two doubtful conditions.

Alling.

Parker's (119, **Sclerocorneal trephining for glaucoma**) statistics show that 81.58% of the 76 eyes operated upon by Col. Elliot while in this country obtained good results as far as reduction of tension was concerned. Good results were obtained in 90.9% of the cases trephined after having had iridectomy done, and 50% in cases trephined after combined extraction of cataract. Of the six failures two were cases of buphthalmos in the same patient; one glaucoma secondary to uveitis after cataract extraction; another hemorrhagic glaucoma, and two chronic inflammatory glaucoma. The conclusions are that the results are better in simple non-inflammatory glaucoma than in other forms.

ALLING.

REBER'S [122, **Report on twenty-six sclerocorneal trephinings (Elliot's operation) for glaucoma**] results in the twenty-six cases of trephining in sixteen patients were satisfactory. In six eyes, the seat of absolute glaucoma, the patients were rendered free from pain and the eyeball preserved. In five eyes that were sightless, there was a small degree of vision gained. In the fifteen remaining eyes, the results were good in that the eyes gained in vision and in usefulness. Some of the lessons that were drawn from a study of the cases were: That the post-operative reaction after trephining is much longer than after iridectomy owing to the presence of lymph under the conjunctival flap; that quiet iritis is not infrequent, that if the edges of the conjunctival flap are brought down to the limbus subconjunctival filtration is interfered with; that a 2*mm* trephine proved more serviceable than a 1.5*mm*; and last, intraocular hemorrhage will occur in a certain percentage of cases.

TREACHER COLLINS (115, **The sclerocorneal trephining operation for glaucoma**), from a microscopic study of cases, concluded that the establishment of a permanent gap in the endothelium of Descemet's membrane is the essential feature in the operation. If this endothelium heals over there will be rise of tension. A complete disk of Descemet's membrane should be removed far enough forward not to encroach on the ligamentum pectinatum. The cornea bathed in aqueous does not tend to proliferate and thus close the trephine hole.

E. J. CURRAN.

GUGLIANETTI (118, **Sclerocorneal trephining**) comes to the following conclusions after having performed Elliot's operation on twenty-four patients. In chronic simple glaucoma the operation reduces the tension to within normal limits; the vision improves in some cases, is not changed in others. Good results are likewise obtained in chronic inflammatory glaucoma by trephining combined with iridectomy, yet in some patients there may be noticed a little increase of tension and a simultaneous impairment of vision. The tension became normal in an advanced case, yet the vision continued to deteriorate. Trephining with iridectomy was successful twice in acute glaucoma. Trephining rendered enucleation unnecessary in two cases of absolute glaucoma. Two eyes with secondary glaucoma had to be enucleated some weeks after the operation on account of severe pain due to iridocyclitis. The eyeball was saved in eight cases. There were no severe inflammatory reactions on the part of the iris or ciliary body.

CALDERARO.

VOSSIUS (124, **Sclerocorneal trephining**) has performed this operation in twenty cases, mostly far advanced, always with a peripheral iridectomy. His results were not as good as those usually reported. Late infection occurred twice with total loss of the eye. Iridectomy is not displaced by trephining, its field is chronic glaucoma with contracted visual fields.

QUACKENBOSS (121, **Sclerocorneal trephining**), in reviewing cases operated upon at the Massachusetts Charitable Eye and Ear Hospital, reports loss of vitreous in three cases, severe iridocyclitis in two, and late infection in one. The cases which came to enucleation were of the hemorrhagic type. He thinks that the conjunctival suture should be used. The operation is the best adapted to the cases of simple chronic glaucoma. An iridectomy should be done if possible and late infection is a dangerous complication.

ALLING.

BUTLER'S (113, **Holth's punch operation for glaucoma**) experience with this operation has been satisfactory and he now uses it exclusively for all varieties of glaucoma—acute, subacute, and chronic. Only six of the twenty-nine cases reported were failures and four of these were due to defective technique. A complete iridectomy is advisable in all cases and the conjunctival flap should be held in place with a suture.

EVANS and BUTLER (116, **The result of modern glaucoma operations**) analyze seventy of their cases of acute and subacute glaucoma and ninety-one cases of chronic glaucoma. In these the operations done were iridectomies, trephine, Herbert's wedge, Holth's punch, and small flap.

In the subacute and acute glaucomas, the scleral operations reduced the tension to normal in eighty-two per cent. and the iridectomies in eighty-eight per cent. In chronic glaucomas, iridectomies reduced tension to normal in seventy per cent., trephine in eighty-seven per cent., Herbert's wedge in eighty per cent, Holth's punch in seventy-seven per cent., and small flap in forty per cent. They attribute some of the good results in the sclerectomies to the fact that an iridectomy was added. In acute glaucoma with reasonable depth of the anterior chamber they consider iridectomy perhaps the most satisfactory operation.

CURRAN.

YOUNG'S (125, **Decompression in glaucoma**) operation is based on animal experimentation. A rabbit's eye was trephined, under a conjunctival flap, behind the anterior scleral ring, no communication between the trephine hole and the anterior chamber being established. A fixed quantity of fluorescein was injected into the anterior chamber and the corneal puncture closed. The other eye was treated in similar manner, but the trephining was omitted. In the non-trephined eye, there was no conjunctival reaction or drop in tension, the fluorescein disappearing from the anterior chamber in one hour. In the trephined eye, copious suffusion of the conjunctiva appeared rapidly, tension dropped, and traces of the fluorescein were in the anterior chamber six hours later. From this it would seem that the secretion of the ciliary body passed out through the trephine opening, the fluid in the anterior chamber remaining stagnant.

The operation itself is along similar lines. After a large flap of conjunctiva is freed to the limbus, two trephine openings are made in sclera above, 6*mm* apart, the openings being behind the anterior scleral ring and separated from the limbus by a strip of sclera. The flap is then sutured in place. In one case reported, that of absolute glaucoma, the tension fell promptly and remained so for two years. A special trephine set is advisable for the operation.

POSEY'S (120, **Myotics in chronic glaucoma**) paper is largely statistical and contains notes on eighteen cases of glaucoma treated by myotics. These are supplementary to sixty-five already published. He compares results in eyes thus treated with those obtained in a similar series where iridectomy had been performed, and claims that myotics exert a much more beneficial influence over the disease. Regarding trephining, he thinks that its claims are not yet proved. He advocates increasing doses at frequent intervals so that the pupils are kept well contracted. This treatment should be confined to cases which have never shown inflammatory signs.

ALLING.

It would appear from VERDERAME'S (123, **Sclerochoroiditis and serous cyclitis with increase of tension**) case that we may occasionally meet with an increase of tension in herpes zoster, instead of the usual subnormal tension.

XX.—RETINA.

126. DIEM. **Retinitis punctata albescens and pigmentosa.** *Klin. Monatsbl. f. Augenheilkunde*, September, 1914.

127. ELLIOT, ROBERT HENRY. **A method of examining large detachments of the retina.** *Ophthalmoscope*, June, 1914.

128. FRIEDENWALD, H. **Retinitis with massive exudate.** *Transactions of the American Ophthalmological Society*, 1914.

129. LANGDON, H. M. **A case of alternating, transient, monocular blindness ending in complete loss of vision in the left eye.** *Ibid.*

130. SCHWEITZER. **Degeneration of the retina in siderosis bulbi.** *Inaug. Diss.*, Greifswald.

DIEM'S (126, **Retinitis punctata albescens and pigmentosa**) patient had a father suffering from retinitis pigmentosa. Retinitic pigment patches and yellow white spots were found in the periphery of the left eye. In addition, yellow-white dots were sprinkled about the macula in both eyes. The writer takes the condition to be a retinal atrophy running a chronic course in which the degeneration varies in different places.

In SCHWEITZER'S (130, **Degeneration of the retina in siderosis bulbi**) first case a pigment-like degeneration of the retina, with loss of vision, hemeralopia, and siderotic discoloration of the iris, set in fourteen years after a piece of iron had been removed from the eye. In his second case degeneration of the retina and siderosis of the eye appeared fifteen years after the removal of the foreign body. No trace of any splinter of iron that had been left behind could be detected in either case.

LANGDON'S (129, **Alternating, transient, monocular blindness**) patient was forty years old and had complained for twelve years of transient attacks of monocular blindness, the left eye being more often affected than the right. He also had recurrent attacks of vertical diplopia. He did not have hemianopsia scotoma scintillans or headaches accompanying the attacks. The ophthalmoscope showed marked sclerosis of the retinal vessels and there were signs of general arterial sclerosis. Recently an attack in the left eye did not clear away and a complete collapse of the retinal vessels was observed. These cases seem to be caused by spasm of the retinal vessels and in case of permanent blindness by circulatory block.

ALLING.

ELLIOT (127, **A method of examining large detachments of the retina**) found that with dilated pupil and a transilluminator a good view of the detachment could be obtained, and that with the aid of a Zeiss loupe the details could be studied.

GROUT.

FRIEDENWALD (128, **Retinitis with massive exudate**) reports five cases which fall into a group recently studied by Coats, entitled "forms of retinal disease with massive exudate." They are characterized by the presence in the fundus of large masses of white or yellow exudate, usually with cholesterin crystals and hemorrhages. The affection occurs in young people in good health and the eyes are eventually lost. The vessels are sometimes found variously distorted. In one of the author's cases he found syphilis, in one typhoid fever with albuminuria, high blood pressure and nephritis in two. The hemorrhagic nature of the exudation seems conceded, but there are often evidences of true inflammatory choroiditis. The original article should be consulted for details of the cases.

ALLING.

XXI.—OPTIC NERVE AND VISUAL TRACT.

131. BYERS, W. G. **Tumors of the optic nerve.** *Jour. A. M. A.*, July 4, 1914.

132. CHANCE, B. **A case of total coloboma of the optic-nerve entrances.** *Annals of Ophthalmology*, October, 1914.

133. FRANCIS, L. M. **Two cases of acute retrobulbar neuritis associated with marked acetonuria.** *Journal A. M. A.*, July 4, 1914.

134. FUCHS. **Position of the lamina cribrosa and atrophic excavation.** *Zeitschrift f. Augenheilkunde*, August, p. 192.

135. HASELBERG. **Metastatic carcinoma of the optic nerve.** *Berl. klin. Wochenschrift*, p. 1237.

136. HEINE. **Diagnostic signification of monolateral optic neuritis or atrophy.** *Ibid.*, p. 1339.

137. HEINRICHSDORFF. **Changes in the optic nerve from arteriosclerosis at the base of the skull.** *Klin. Monatsbl. f. Augenheilk.*, October–December.

138. STERN. **Shot wound of the optic thalamus, with remarks concerning tractus hemianopsia.** *Neurol. Zentralblatt*, No. 11.

139. TSCHIRKOWSKY. **Choked disk with multiple sclerosis.** *Klin. Monatsbl. f. Augenheilkunde*, October–December.

TSCHIRKOWSKY (139, **Choked disk in multiple sclerosis**) reports a case of this nature that he examined anatomically. The clinical diagnosis was tumor of the cerebrum, but the pathological examination established the identity of the affections in the visual tract with foci in other locations. The difficulties encountered by the circulation of the blood and lymph throughout the whole extent of the optic nerve were thought to be the cause of the œdema of the papilla.

FUCHS (134, **Position of the lamina cribrosa**) states that the position of the lamina cribrosa at the entrance of the optic nerve may vary. An excavation may be formed in simple atrophy, and on the other hand simple glaucoma can exist without any excavation.

In HASELBERG'S case (135, **Metastatic carcinoma of the optic nerve**) the disease began as an optic neuritis with impairment of vision in a patient with carcinoma of the breast. Later opacity formed in the retina, and the eye was enucleated on account of increase of tension.

HEINE (136, **Diagnostic significance of monolateral optic neuritis or atrophy**) found over half of forty-six cases of retrobulbar neuritis caused by multiple sclerosis. In one case the multiple sclerosis did not make itself manifest until ten years after the onset of the eye trouble. Other diseases are more likely to be the cause when the retrobulbar neuritis is bilateral.

HEINRICHSDORFF (137, **Changes in the optic nerve from arteriosclerosis at the base of the skull**) describes the findings at an autopsy. The carotids were greatly changed by arteriosclerosis so that they compressed the optic nerves in the bony canal. During life the hemianopsia was ascribed to a cerebral cause, as pressure upon the optic nerve does not seem to affect the most peripheral bundles of fibers, but causes the central ones to atrophy.

Stern (138, **Shot wound of the optic thalamus**) describes a case of shot wound of the skull in which symptoms indicated a lesion in the neighborhood of the optic thalamus. Among the ocular symptoms were: transient paresis of the abducens, hemianopsia with a preserved central visual field, hemianopic pupillary immobility, and atrophy of the optic nerve. The pupil on the side of the hemianopsia was the larger and reacted slowly.

A careful examination failed to disclose such causes as hysteria, disease of sinuses, alcohol, tobacco, etc., and Francis (133, **Acute retrobulbar neuritis associated with acetonuria**) therefore concludes that his cases were caused by toxæmia associated with acetonuria. Alling.

Byers (131, **Tumors of the optic nerve**) distinguishes two forms of intradural tumors. One an overgrowth of the connective-tissue elements of the nerve—the other a proliferation of local endothelial cells. They however merge into each other. The former greatly outnumber the latter in frequency. They are usually associated with intracranial tumors of the same nature. As to extradural tumors they are much less common and are mostly endotheliomas, a few being sarcomas. They are of more rapid growth and are often followed by metastases. He advances arguments for early operation. The Kroenlein operation is adapted only to small tumors, while the Knapp method (entrance through an external canthotomy) is the more generally useful. Alling.

Chance (132, **Total coloboma of the optic-nerve entrances**) saw a case with a very deep funnel-shaped excavation of the optic nerve about twice the size of the normal disk. There was no defect in the choroid or retina. The apex of the cone could not be made out but appeared to be about 30 D. in depth. The border of the cavity was surrounded by a faint pigment ring. The two eyes were similarly affected. The vision was $\frac{5}{15}$.

Alling.

XXII.—ACCIDENTS, INJURIES, FOREIGN BODIES, PARASITES.

140. BALLANTYNE, ARTHUR J. **Alternating hyphæma. An unusual result of concussion of the eyeball.** *Ophthalmoscope*, June, 1914.

141. FUCHS. **Iron left behind in the eye after extraction of a fragment.** *Zeitschrift f. Augenheilkunde*, August, 1914, p. 192.

142. MANZUTTO. **Visual disturbances ascribed to a strong current of electricity.** *La clin. oculist.*, March–April, 1914.

143. SPEYER. **Wound of the vitreous by a fragment of copper.** *Klin. Monatsbl. f. Augenheilkunde*, July–August, 1914, p. 194.

144. VAN DER HOEVE. **An uncommon injury of nerves.** *Ibid.*, October–December, p. 584.

SPEYER (143, **Wound of eye with copper**) reports a case in which a piece of copper entered the vitreous. It was removed the next day with forceps. Later the cataractous lens was removed, and the final vision obtained with correction was 0.8.

VAN DER HOEVE (144, **Uncommon injury of nerves**) reports a curious case. After a stab wound in the left outer canthus there followed a total paralysis of the muscles of the right eye, the right optic nerve, and an anæsthesia of the right cornea. A roentgenogram showed a knife 8*cm* long between the outer margin of the left orbit and the right optic foramen.

MANZUTTO (142, **Visual disturbances from electricity**) reports the case of a young workman who received a current of five hundred volts. When he came to, he could not see and had the sensation of a strong dazzling, and of a burning of the lids and other parts of the right eye. On the evening of the same day the burning, lacrimation, and redness of the eyes disappeared. Vision returned to the left eye first, later to the right, in which the sensation of dazzling was succeeded by severe local pain. At the end of fifteen days vision amounted to seeing movements of the hand, although there were no perceptible changes. At the end of a month it was $\frac{9}{12}$.

CALDERARO.

FUCHS (141, **Iron left behind after extraction of a fragment**) reports two cases in which iron was left in the eye after a fragment had been extracted. The extraction took place at the end of twenty days in one case, on the day following the accident in the other.

In BALLANTYNE'S (140, **Alternating hyphæma**) patient a peculiar phenomenon was observed, namely, the disappearance of the hyphæma on fixation of a near object and its reappearance on relaxation of accommodation. Of the various explanations offered, that of a separation of the ciliary body from its scleral attachment seems the most logical. By this separation, a free communication was established between the anterior chamber and the suprachoroidal space so that during accommodation the ciliary body and possibly the choroid were drawn away from the sclera, forming a space. Into this space the blood passed during accommodation, returning to the anterior chamber on relaxation of the ciliary muscle.

BOOK REVIEWS.

IV.—**England's Augenärzte,** 1800–1850. Geschichte der Augenheilkunde, von Dr. J. HIRSCHBERG, Professor in Berlin. Graefe-Saemisch-Hess. Handbuch d. Augenh'lk. Leipzig. Engelmann, 1915. (England's Oculists, 1800–1850. History of Ophthalmology, by Dr. J. HIRSCHBERG, Professor in Berlin.)

Soon after graduating from the Harvard Medical School in 1870, I went to the Royal London Ophthalmic Hospital at Moorfields, and for more than two years spent my time amongst the great men of that era in ophthalmology: Bowman, Critchett, Lawson, Soelberg-Wells, and many others. During that time I must have chloroformed daily for various operations as many as a dozen patients, whilst the late Edward Nettleship was my frequent companion in pathological and microscopical studies.

From those days to this the memories of that wonderfully interesting era have often come back to me; often too have I looked over the diaries which I then kept and repeatedly have I wished that someone with the needed ability would write a history of that era, so that I could add it to my own recollections of those famous days in ophthalmology, when every clinic provided some new discovery by the London oculists to supplement those which the great masters in Germany were making.

At last those long unfulfilled desires have been satisfied, and there lies before me for review a complete, accurate, detailed, and well indexed history of all that the skillful oculists of the British Empire including all of its colonies have accomplished for the study and advancement and improvement of the causation, pathology, and medical or surgical cure of the diseases of the eye from the foundation of ophthalmology to our own days.

For, although it is true that this history states that it treats of the years 1800–1850, this fact proves, on opening the book, to be a misnomer, for a history which includes the life and career and a critique of all of the published essays of Edward Nettleship, who died but yesterday, actually includes everything of value to ophthalmology that has been published in England and its colonies down to the year 1912.

This monumental work of nearly 500 pages includes all of the advances in English ophthalmology to date, and additionally offers to the reader very valuable biographical notices and many excellent portraits of the Britons who have done so much for ophthalmology. Some of these portraits lack artistic value, and some of them show the men in their youthful years, but on the whole they add to the biographical value of the work. The reader will miss a portrait of the late Soelberg-Wells, concerning whose remarkable *Treatise on Diseases of the Eye*, probably the best one ever issued in Great Britain, all too brief mention is made. For others came before, and more recent ones have pushed it aside, but in style, and in clarity of description, Soelberg-Wells's "Treatise" will long stand historically as England's best.

Beginning, now, with a review of ophthalmic conditions in England in 1800, Professor Hirschberg proceeds to quote from the diaries of continental surgeons' visits to the chief centers of population at that time and shows how little attention was given to the eye at all. From those we advance to notices of Wardrop and Vetch, beginners in ophthalmology in 1820–30, and many now unknown writers, until we see the shining light of William Adams with his studies in Egyptian ophthalmia; Saunders who first emphasized the dangers of infantile ophthalmia, and iritis with its treatment with atropine. Twenty pages are then given to a study of discission for cataract removal, and then we reach Travers, distinguished for his advocacy of mercurials in iritis, and his remarkable book on *Diseases of the Eye*, epoch-making as it was.

Following these notes on Travers, we reach a very clever account of Sir William Lawrence with many biographical details, and full mention of his energetic study of syphilitic diseases of the eye, and his well written book on *Diseases of the Eye* and his noteworthy personality in ophthalmic surgery.

Another man worth noting at this place is Frederick Tyrrel, who died in 1843, but left behind him memories of his "hook" and his "*Practical Work on the Diseases of the Eye.*" James Dalrymple next interests us for his attention to the pathology of the eye, to strabismus, and to malignant tumors in the eye and orbit. And to close that era of ophthalmology, previous to the great discovery of the ophthalmoscope, we mention James Dixon who survived until 1896, and who first saw with artificial illumination the retina in an aphakial eye, removed foreign bodies from the vitreous, mentioned, probably for the first time, cysts of the iris, and wrote a very clever *Guide to the Practical Study of Ophthalmology* in 1855. Here now we reach the era of enormous advances in ophthalmology illuminated in Great Britain by Sir William Bowman, George Critchett, and others of that date. To those two men alone, as many as forty pages of Hirschberg's work are given, all of their essays are mentioned and dated, and credit is given to them both for all that they accomplished. Critchett was a wonderful operator, delicate, precise, exact. His corneal sections were smooth, his iridectomies in glaucoma exquisitely neat, his suturing in advancements exact, and he was the first to chloroform for cataract extraction. Mention is also made, as I well recall, of his studies to prevent sepsis of the extraction wound by making it linear, smooth, and just large enough to remove the cataract safely, without bruising the iris. Of Sir William Bowman we learn from this book, his extreme interest in diseases of the tear-passages, his double-needle operation for detachment of the retina (many of which I saw him perform), his studies in conical cornea, and his numerous lectures and essays on the physiology and surgery of the eye.

Oddly enough of Soelberg-Wells little is said, as has already been mentioned, whilst Sir Jonathan Hutchinson is too briefly dismissed, considering his famous studies in the syphilitic diseases of the eyes, and his epoch-making observation of the specific teeth of children's interstitial keratitis.

Too little is said in the work under review of the enormous number of studies of the ophthalmoscopic images of the interior of the eye accomplished at Moorfields by this famous band of skillful surgeons, for personally I cannot help recalling many kindnesses in instruction received in this point of view from these men of Moorfields in the beginning of my studies in ophthalmology.

However, in a work even of these dimensions, it is impossible to mention all that London did for ophthalmology, and we now are called to the studies and advances made at the many other hospitals in London after so much space has been given to those at Moorfields. Amongst the names mentioned in the next hundred pages of Dr. Hirschberg's book, we can merely annotate those of Marcus Gunn, eager in his studies of the erect ophthalmoscopic image, Hancock with his suggestion of transfixing the ciliary muscle in glaucoma, Lawrence the editor of *The Ophthalmic Review*, Carter early student of color-blindness, and John Hughlings Jackson and his studies in diseases of the eye in connection with nervous affections.

Leaving the Metropolitan oculists behind, Dr. Hirschberg now conducts us to Manchester, where Benjamin Gibson early discised soft cataract, and John Walker lectured on the eye; and from there to Glasgow, forever famous as the abode of William Mackenzie with his epoch-making *Practical Treatise on Diseases of the Eye* (1830) in which we find first mention of sympathetic ophthalmia—the scourge of those injured of an eye, and the dread of every oculist attending perforating injuries of that organ.

In his account of Birmingham, mention is made of Middlemore and of his excellent "Text-Book"; of Bristol, with an appreciative notice and a speaking likeness of Prichard; of Leeds, with some account of Pridgin Teale, who has done so much for advances in glaucoma study; and of Edinburgh, where we read of Robertson and of his studies on the condition of the pupil in health and in disease. From here, the reader is taken to Ireland, where at Dublin we read much concerning Sir William Wilde with his unique English essay, *On Malformations of the Organ of Sight*, of A. Jacobson (Jacobson's Membrane) and early mention of panophthalmitis, and of Sir Henry Swanzy, author of an excellent *Hand Book on Diseases of the Eye.* The finishing touch to Ireland consists in a visit to McKewon of Belfast, and mention of his priority in magnet operations for the extraction of foreign bodies from the vitreous.

In the last pages of Hirschberg's work I find brief yet comprehensive notice of the ophthalmic advances accomplished in the British Colonies, in the way of attempts to expurgate from Egypt that dreadful endemic ophthalmia, of the introduction and cultivation on an enormous scale of the intracapsular extraction of cataract, and of the introduction of trephining for glaucoma in the Indian dominions of the British Crown.

The reader of this review cannot, I trust, fail to comprehend that in Professor Hirschberg's work we have a truly valuable contribution to the history of ophthalmology in the British Empire, well composed, well arranged, carefully indexed, and written in a delightfully attractive style. To every oculist interested in the history of his specialty, I most highly commend this work; let those who care for it all, read it through from beginning to end, whilst to the student of ophthalmic literature or to the studious investigator of biographical and ophthalmological facts, I also commend the work for examination, by means of its copious and, so far as I can discover, exact index of names and of innumerable subjects mentioned. Finally, to the genial writer, let me offer most abundant praise and thanks, for doing for Great Britain and its advances in ophthalmology something that no English writer had ever yet been able to do for his native land.

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V.—**An Introduction to the Study of Color Vision.** By J. HERBERT PARSONS. London. G. P. Putnam's Sons, New York. Price, $3.75.

Mr. Parsons has presented us with a work of rare quality and great importance. It is not so much for the vast amount of information that he has gathered—although this alone would make the book valuable—as for the judicious and impartial way in which the information has been arranged and collated that the reader will be grateful to him. As Mr. Parsons says, many writers on this subject have some special theory to defend; and the matter still contains so many uncertainties that a just appraisement of the several theories is not readily to be had. It is all the better, therefore, that Mr. Parsons has no theory of his own to maintain, and it is even an advantage that he has no investigations of his own to offer. His mind seems, indeed, to have been set wholly on the task of showing what others have accomplished, and, because of this singleness of purpose, he has succeeded in presenting a well-digested, harmonious, and happily proportioned summary of probably most of the important articles on color vision and its anomalies down to the date of writing.

The book consists of three parts. The first, giving "The Facts of Color Vision," states, first, the physical, anatomical, and psychological bases on which the perception of colors depends; then treats in succession of the hue, luminosity, and saturation of colors, of color mixtures, the adaptation of the eye, the color fields, the phenomena of recurrent vision, flicker, after-images, fatigue, the effects produced by varying the area of retinal stimulation, contrast, and a very interesting series of chapters on the comparative psychology and the evolution of color vision in animals, in the primitive races, and in the child.

Part II. treats in an adequate way of the chief facts of color-blindness, irrespective of the theories that have been framed to explain them, and Part III. describes these theories with the arguments that have been adduced for and against each. Those who have been brought up on the idea that color vision and color-blindness can be explained by one theory, or by either one of two theories at most, will be surprised to find that no less than ten hypotheses have been advanced to account for the complex conditions presented.

Mr. Parsons's book is not easy reading. This is not saying that the descriptions are not lucid and accurate, for they are. But the things described are themselves not easy of comprehension, and in not a few instances require for their full understanding some knowledge of the higher mathematics. Moreover, there is such a mass of facts presented, all closely inter-connected, that the reader, in order to grasp their significance, has to study the text with careful and minute attention. Nevertheless, we are sure, the book will make a strong appeal to those who, whether ophthalmologists, physiologists, or psychologists, are interested in the study of color vision and its anomalies, and these will not grudge even a large amount of time and thought given to its careful perusal, knowing that they will be well repaid. To ophthalmologists, who may not care to go into the matter so deeply, the book can still be cordially recommended as a work of reference, complete, trustworthy, and up to date.

A. DUANE.

ARCHIVES OF OPHTHALMOLOGY.

THE PRESENT POSITION OF SCLEROTOMY, WITH ESPECIAL REFERENCE TO THE DANGER FROM LATE INFECTION.

By T. HARRISON BUTLER, M.D., Oxon.,

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IT is now nearly ten years since Lagrange introduced his operation of sclerectomy. During the past decade, Freeland, Fergus, Elliot, and Verhoeff, have perfected the operation of trephining; Holth has evolved the punch method, and Herbert has devised a series of operations based upon sclerotomy rather than sclerectomy. All these procedures aim at the production of a fistulous or filtering scar. To-day the literature of the subject would fill volumes, and sclerotomy is being performed by almost every ophthalmic surgeon in the world. I say almost, for some, with singular perspicuity, have obstinately refused to be convinced of the surgical soundness of the fundamental principles of the method. The tide of sclerotomy has reached high-water mark, but even now signs are not wanting that the ebb has commenced. It may even be that iridectomy, which has been widely condemned, I think, upon wholly insufficient evidence, may once more become the usual operation for all kinds of glaucoma.

It is I think clear that most of the methods used to obtain a filtering scar are equally efficient. One surgeon finds Lagrange's operation best suited to his technique, others, the majority, prefer trephining, while a few including myself choose the Holth procedure. A few again remain faithful to Herbert's wedge isolation method. All these plans yield the desired scar in the majority of the operations; all fail not infrequently, and finally all the methods are liable to that final tragedy which is inherent in a filtering scar—late infection.

At the present time it ought to be possible to arrive at a tentative estimation of the real position which sclerotomy should occupy in the treatment of glaucoma. Is it the operation of election in almost all cases of glaucoma as Elliot would have us believe? Is iridectomy to be selected in acute cases, and sclerotomy reserved for the majority of the chronic cases? Or are the dangers of sclerotomy so real that it must only be performed when iridectomy has failed or is otherwise unsuitable?

Before trying to answer these vital questions I would point out that the majority of operators prefer to combine iridectomy and sclerotomy; we are not therefore comparing iridectomy with sclerotomy, but balancing the results of pure iridectomy against sclerotomy cum iridectomy; in other words we have to choose between a simple procedure and a more complicated one.

Again, we have successful cases of iridectomy with a duration of anything up to twenty years, and can only compare them with sclerotomies dating back little more than six or seven years. It is obvious that any judgment we make can in its essential nature be only of a provisional nature.

Before passing even a tentative verdict we must answer a further question. Have the results of sclerotomy shown any marked superiority to those of iridectomy? This question has most certainly so far not been finally settled. The answer can be based only upon extensive statistics, and it is essential that the majority of the cases shall have been followed up for five years or more. The actual presence of chronic glaucoma should be verified by the condition of the disks, the nature of the fields of vision, the size of the blind spot, and the tension as measured by the Schiötz tonometer. It seems necessary to insist upon a careful examination, because I feel certain that operations have been performed in cases where the actual evidence of glaucoma was far from convincing. I have myself seen cases of women at the menopause when there were pain and slight hypertension relieved by miotics. The disks were "suspicious," if not actually pathologically excavated. Careful examination of the fields and blind spots failed to confirm the diagnosis of incipient glaucoma, and they have all so far lost their symptoms. Such cases can be submitted to operation, and help to swell the list of good results. The necessary statistics cannot be collected from the work of a single operator. Glaucoma is happily not so common as to furnish any one surgeon with a sufficient number of cases unless indeed he is fortunate enough to be the director of a large continental clinic. We must, I fear, rule out Indian experience, because after four years of work at the British Ophthalmic Hospital in Jerusalem I am aware that only a small proportion of the visitors to this type of clinic ever reappear, and it is precisely the failures which are lost sight of. Nor is it often possible in the case of an ignorant native to map out the fields of vision and the blind spot. We must rely upon work among civilized races.

As far as I am aware the statistics I suggest have not been collected and published and we are not yet in a position to state that sclerotomy should take the place of iridectomy because the results are markedly superior.

In 1913–14, Mr. Jameson Evans and myself made an analysis of all our operations for all kinds of glaucoma extending over a period of five years. They were collected from our private operations, and from the work done at the Birmingham Eye Hospital, the Coventry General Hospital, and the Leamington General Hospital. We found that we had performed 161 operations, a number far too small to yield reliable statistics. Our analysis was presented to the Oxford Ophthalmological Congress in July, 1914, and was published in the *Ophthalmoscope* for August, 1915. We were both much surprised to find that we each independently had obtained results from simple iridectomy which were as good as those which had followed the various operations of sclerotomy. For the convenience of those who have not access to the paper, I append a summary of our analysis. I freely admit that the numbers are far too small to be of value, but they do at least suggest that iridectomy is not so ineffectual as some ophthalmologists would have us believe.

STATISTICS OF OPERATIONS FOR GLAUCOMA

ACUTE AND SUBACUTE CASES

Operation.	Number of Cases.	Vision Improved or Preserved.	Tension Reduced to Normal.
Sclerotomies	42	32 = 76%	35 = 82%
Iridectomies	28	20 = 71%	23 = 88%
Total	70	52 = 74%	58 = 83%

CHRONIC CASES

Operation.	Number of Cases.	Vision Improved or Preserved.	Tension Reduced to Normal.
Iridectomies	30	25 = 83%	21 = 70%
Trephine	23	17 = 74%	20 = 87%
Herbert's Wedge	15	11 = 73%	12 = 80%
Holth's Punch	18	13 = 72%	14 = 77%
Herbert's Small Flap	5	2 = 40%	2 = 40%
Total	91	68 = 75%	69 = 75%

ALL CASES

Operation.	Number of Cases.	Vision Improved or Preserved.	Tension Reduced to Normal.
Total	161	120 = 74%	127 = 78%

These figures bring out four points. There is little to choose between the various operations performed. The percentage of good results is higher than might be imagined even if we consider the average duration of these cases to be only two years. It amounts to about 75% of all cases. The visual results are as good in chronic as they are in acute glaucoma. And, finally, the table shows the comparative rarity of operations for glaucoma.

Mr. Evans has been responsible during the period under consideration for about 50,000 patients at the Birmingham Eye Hospital. I have gathered my operations largely from the clinics at Coventry and Leamington and during the past five years must have seen about 18,000. This gives a total of

68,000 new patients, and with all our private patients added in they yielded only 160 operations for glaucoma. Even if we exclude the trivial accidents and foreign bodies which swell the total, the figure is only about 1%. This shows how impossible it is for any single individual to form conclusions of any real value as to the comparative efficiency of the various operations he has performed for glaucoma.

I can discuss the question only by relying upon my personal experience drawn from some seventy operations, and from what I know of the results obtained by my colleagues at the Birmingham Eye Hospital. My senior colleague, Mr. Wood White, tells me most emphatically that although he has tried sclerotomy he is still well satisfied with the results of iridectomy which he regards as the operation of election in most cases of acute and chronic glaucoma. At the time the above table was prepared and up to the end of 1914 my choice of operation would have been as follows: iridectomy for acute glaucoma and for mild cases of chronic glaucoma which were very gradually losing ground under miotic treatment; sclerotomy for subacute cases and for well-developed or long-standing examples of the chronic disease. During the past six months, however, the occurrence of eight cases of late infection which led to the total loss of four eyes has forced me to alter entirely my opinion and to conclude that sclerotomy is so dangerous that it must be reserved for selected cases only. I am reluctantly obliged to abandon an operation which has apparently cured many of my cases, because the subsequent history of so many of them has been thoroughly bad. I propose, therefore, to critically examine the two operations and to try to answer the three questions I propounded at the beginning of this paper.

What are the objections to iridectomy?

It has been said that it is ineffective, that it is technically dangerous, that in cases with a small field it may cause total loss of central vision, and that it may be followed by expulsive hemorrhage.

Iridectomy is ineffective. I have not found the operation ineffective. Both Mr. Evans and myself find that it has been successful in 75% of our cases, and that its results compare favorably with those of sclerotomy. This applies to all forms of glaucoma. I have several patients who have been operated upon by iridectomy by older surgeons from ten to twenty years ago in whom the disease has been permanently arrested.

The operation is technically dangerous. I have so far only lost one eye after iridectomy. The iris prolapsed, and iridocyclitis necessitated enucleation. I have had far more trouble with sclerotomy. It is true that in cases with a very shallow anterior chamber, which have been rare in my practice, the operation demands great care and a high degree of skill, but generally it is far easier than any form of sclerotomy. The lens has been wounded during iridectomy, but so far I have escaped this complication. I have, however, made a section of an eye I had trephined, and the lens capsule was ruptured and lens substance blocked the trephine hole. I had not the slightest idea that the trephine had been anywhere near the lens.

Vision may fall rapidly after iridectomy. This is unfortunately true. I have recently had two examples in which a small iridectomy was made for chronic glaucoma. In each case the patient was ready to leave the hospital within a week and never had the slightest injection of the eye. Yet the vision was much worse after the operation although the tension had been reduced to normal. I have had the same experience after an uncomplicated sclerotomy with small basal iridectomy. The catastrophe seems to be the result of decompression rather than a peculiarity confined to iridectomy.

Expulsive hemorrhage. This is a tragedy to be feared during the old classical iridectomy with a large incision. It is my practice to make a very small iridectomy, and I have successfully treated a case of hemorrhagic glaucoma secondary to thrombosis of the central vein by a small iridectomy.

As far as I can see the only valid objection to iridectomy is that it may fail to reduce tension in cases of chronic glaucoma. In such cases it is easy subsequently to trephine the eye.

My practice is to make an incision with a small keratome or bent broad needle entering behind the limbus. I then withdraw the iris with Matthieu's forceps (Liebreich's), and cut it off with one snip of the scissors. This small incision avoids most of the dangers of the old broad iridectomy, and the result is as good in my practice as that following the larger excision of the iris. If iridectomy acts, as Fuchs and Thomson Henderson teach, because the cut iris never heals, a small iridectomy should be as effective as a large one.

What are the objections to sclerotomy?

They can be divided into two groups: immediate and remote. We shall see that the remote complication is a formidable one, and practically is so important that it is not necessary to devote much attention to the minor disadvantages.

Immediate objections:

Technique. Nearly all the operations include iridectomy and, therefore, as the whole is greater than its part, and sclerotomies are more difficult than simple iridectomy, they are more complicated, and constitute a greater trauma. But even simple sclerotomy however performed demands a very special technique, and any departure from the best method is liable to yield unsatisfactory results. Elliot lays great stress upon the facility of trephining. Anyone can make a hole in an eye, but the correct trephining operation is in my opinion very difficult, demanding much thought, care, and skill. The same applies to the punch operation, to Lagrange's method, and to the wedge isolation. In the hands of the ordinary ophthalmic surgeon I feel sure that simple iridectomy is far easier than any form of sclerotomy.

The unreliability of the results. It is very difficult to obtain a satisfactory filtering scar. In some cases the wound, whether made with trephine, punch, or scissors, heals up solidly and no filtration occurs. These operations, if associated with iridectomy, may nevertheless be quite efficient. In other cases a large ectatic bleb forms which is ugly and may be uncomfortable. Even these scars though obviously fistulous may fail to reduce the tension. This fact has been noted by both Mr. Evans and myself. Again any form of filtering scar may cause prolonged low tension.

Late re-formation of the anterior chamber. This is an anxious complication. In one of my patients I made a small buttonhole in a very thin flap. The anterior chamber took fourteen days to re-form. My patient had only one eye and I heartily wished I had performed iridectomy. Ultimately the chamber refilled, but a myopia of 1.5 D. was added to the original refraction. I have noted this development of myopia in other cases.

Iritis. Sclerotomies are far more liable to slight iritis than simple iridectomy, a fact emphasized by Elliot.

There are many other complications which can be avoided only by a carefully worked out technique, but they can to a large extent be escaped and so do not constitute a real objection in the hands of a skillful surgeon. But I see no means of guaranteeing the correct scar. I have performed upon the same day two exactly similar punch operations. One has healed up solidly, the other has yielded an ectatic scar.

Remote complication. Late infection is the final tragedy of sclerotomy.

It is a matter of common knowledge that the cystoid scar which occasionally follows cataract extraction is highly dangerous. Many eyes have been lost years after the extraction, and all ophthalmologists do all they can to prevent any entanglement of iris or capsule in the wound, because they quite justly fear late infection. And yet, such are the changes in fashion, for the past five years we have all been trying to produce filtering scars which in many cases are cystoid cicatrices. Some of us have already paid the full penalty.

At first we heard little of the matter. Elliot devotes only a few sentences to it in his book. But during the past three years cases have been reported in increasing frequence. The paper which Mr. Evans and I read at Oxford last July was followed by a discussion which practically was a discussion on late infection. One member of the Congress after another rose up and cited cases of late infection which included panophthalmitis and even sympathetic ophthalmitis. It was obvious that they were seriously anxious about the matter. I had then had only one example following a wasp sting, and I had not realized the import of the complication. However, this year I have had seven more cases, a veritable epidemic of late infection. The matter is of such vital import that I offer no apologies for giving the abridged case histories. It will be seen that late infection has followed every class of scar, the apparently solidly healed, the satisfactory scar, and the ectatic. All the ectatic cases ended favorably, so there seems no reason to fear this type of scar more than the others.

It is convenient to divide the cases into *acute infections* which destroyed the eye, and *mild infections* which recovered. It will be seen that I have experienced four of each. Owing to the great pressure of hospital work caused by the war it has been impossible to work out the bacteriology, but the exact nature of the infective agent is of little moment.

ACUTE INFECTIONS.

H. D. Male, aged 36 years. This was a case of heterochromic cyclitis in which the typical cataract and glaucoma developed. The cataract was extracted after preliminary iridectomy, and a vision of $\frac{6}{5}$ and J. i. was obtained. The man returned to his employment, boring naval guns, and worked for a year. The typical glaucoma now rapidly developed. The tension rose and the disk became cupped, with a contracting field.

On January 24, 1910, the eye was trephined below. The disk entered the anterior chamber and was extracted with Matthieu's forceps with much difficulty. The eye was injected for nearly a month, but quieted down completely. Basal iridectomy was combined with trephining so the patient had two colobomata: one up, one down. The aperture healed up solidly and there was never any obvious filtration. The tension remained normal, but the disk gradually became more and more excavated, and sight was slowly reduced.

In February, 1915, five years after the operation, the patient reappeared with an intensely injected painful eye. The anterior chamber was full of pus, and there was a large intercalary staphyloma. I had not seen the man for a year, but I gathered that the eye had become suddenly inflamed some weeks previously. The eye was enucleated, and a second large staphyloma was found in the posterior segment.

It is possible that this was not a true example of late infection, but was the natural end of the heterochromic cyclitis. The eye had never been injected during the five years I had him under observation, although the keratitis punctata which is a characteristic feature of the disease was always present, even when the vision was $\frac{6}{5}$. I am disposed to regard the inflammation as due to an infection from outside, and include it with the others.

E. H. An alcoholic female, aged 55 years. A case of chronic glaucoma. T = 82*mm* and 72*mm* of Hg. by Schiötz tonometer. Deep cups. VR = $\frac{6}{10}$, VL = hand reflex only.

Feb. 16, 1914. Punch operation with complete iridectomy upon the right eye. A satisfactory filtering scar developed with no ectatic bleb. The vision rose to $\frac{6}{18}$. The tension was permanently reduced to normal.

April, 1915. Condition of eye satisfactory. T normal; V = $\frac{6}{18}$. The operation was regarded as a complete success.

May 3, 1915. Fifteen months after the operation the patient appeared with the eye in a state of acute panophthalmitis and I was compelled to eviscerate it. She stated that fourteen days before she had "ulcers" on the left lower lid. These got better. Then the right lower lid became "ulcerated" and three days ago the eye became inflamed and painful.

Here we have a clear history of acute conjunctivitis followed by panophthalmitis. A useful eye was destroyed, although the scar was a satisfactory one with no prominent bleb.

We shall see later that the left eye which had also been punched became infected but recovered.

W. J. Male, aged 64. Suffered from chronic glaucoma with T + 1. VL = hand reflex.

Feb. 20, 1914. A Holth's punch operation was performed upon the left eye and a basal iridectomy was added. A very small tear was detected in the flap. It was sewn up and healed perfectly.

The second eye was also punched and is still in a satisfactory condition with good vision and normal tension.

March 15, 1914. The tension of the left eye is normal. The punch hole contains a tag of iris; there is good filtration but no bleb. No sign of any opening or thin spot in the conjunctiva. V = fingers at one foot, an increase from hand reflex.

April 10, 1915. A year and two months after the operation the patient appeared with a late infection. There was a yellowish opaque swelling over the aperture with intense injection and hypopyon. T + 1, V = P.L. Under treatment the iridocyclitis quieted down, and the hypopyon absorbed. The swollen area over the scar flattened down. The eye, however, became very soft, and remained injected. Vision was entirely lost, so the eye was removed.

Here again we have a clear case of late infection. Fortunately the eye was of no value. The buttonhole at the operation may have been a factor in the result, although the scar seemed to be a very satisfactory one.

E. L. Aged 57, an alcoholic female. She was suffering from subacute glaucoma of several months' duration, which had been absolutely neglected. VR = $\frac{6}{10}$. T + 1. Field contracted to 30°. Deep glaucomatous cup in each disk.

April 16, 1913. Punch operation with basal iridectomy under ether anæsthesia. The sclerotomy reduced the tension to normal, but in spite of this all sight was rapidly lost. The operation, although it cured the inflammatory state and reduced the tension to slightly subnormal, seemed to hasten the loss of sight.

August 6, 1913. The patient was stung on the upper lid by a wasp which caused much swelling of the lid and redness of the eye.

Sept. 17, 1913. Patient appeared and the eye was found to be acutely injected. There was a yellowish white area over the punch hole and an acute iritis. The iritis quieted down under atropine, but the hole closed up completely with cicatricial tissue. The tension rises occasionally, but there has been no more pain. The left eye still has V = $\frac{6}{5}$. Tn, but there is a deep glaucoma cup.

SLIGHT CASES

E. S. Aged 70, female. Affected with paralysis agitans. Suffered from slowly progressive chronic glaucoma in each eye. T R and L = + 1.

February 4, 1914. Holth's punch operation with a basal iridectomy was performed upon the right eye. A similar operation had been carried out upon the left eye on January 21st. Large ectatic scars developed on both sides, but tension was permanently reduced, and sight maintained at $\frac{2}{60}$ in each eye.

November 13, 1914. Eight months after the operation, the patient appeared with a severely inflamed right eye. The bleb was now yellow in color, and there was great œdema of the surrounding conjunctiva. Pain was severe and the iris was muddy. Posterior synechiæ had already developed. This patient had been shown to the Midland Ophthalmological Society as an example of undesirable ectatic scars. I was now able to show her to the same society as a case of late infection. Fortunately the eye treated with atropine and muff warmers made a complete recovery.

C. G. Aged 60. A case of chronic glaucoma. When this lady came under my charge nearly two years ago her right eye had been removed by Mr. Pooley of Sheffield for intraocular tumor. Her vision was then $\frac{6}{6}$, but the aspect of the left disk was very suspicious. The case was watched closely and it soon became obvious that chronic glaucoma was present. In spite of miotics the field contracted and vision fell to $\frac{6}{24}$. The tension rose to 50*mm* of Hg. and I was compelled to operate.

January 29, 1914. Punch operation with complete iridectomy. A large ectatic scar developed gradually, but in spite of this the tension occasionally rose to 35*mm* Hg.! The acuity was for a time improved to $\frac{6}{9}$, but the lens is gradually becoming cataractous with increasing myopia.

June 1, 1915. I saw the patient and found that she was holding her own well. I, however, remarked to my Belgian House Surgeon, Dr. Thienpont, late of St. Nicholas, that I regarded her bleb as a dangerous one liable to late infection.

My words were prophetic, for three days later, on *June 4, 1915*, five months after the operation, the patient appeared with an infected eye. The bleb was covered by a raised, flat, milky-white matt area of conjunctiva. The eye was painful, and there was considerable ciliary injection, but no further evidence of iritis. A culture on blood serum was made, and we obtained a luxuriant growth of a greenish gray mold, which the Botanical Department of Birmingham University pronounced to be *Mucor septatus*. A rapid cure was attained by the use of protargol drops, and now all immediate danger is at an end. As a matter of fact I believe that the infection did good, for the bleb has flattened down and is I hope now less liable to infection.

E. H. The case of panophthalmitis described above came up on *June 21, 1915*, with acute iritis in her remaining eye. This eye was punched on *February 9, 1914*, sixteen months before the infection. She was restless at the operation and a drop of vitreous appeared in the wound. In consequence no iridectomy was performed, and the flap was not sutured. The eye was dressed forty-eight hours later; it was looking perfectly healthy, but the flap had rolled back leaving the punch hole freely exposed. An anæsthetic was administered and the flap sutured in place. The eye did very well. The tension of 72*mm* of Hg. was reduced to normal, and vision is still well maintained at $\frac{6}{18}$. A sound filtering cicatrix developed, which showed no tendency to bulge. This case has completely recovered and her present state is satisfactory. This eye had resisted the infection which destroyed its fellow.

E. F. Aged 52, first consulted me on *December 18, 1913*. I found that she had, unknown to herself, completely lost the sight of her right eye from chronic glaucoma. As the eye had occasionally shown some tendency to become inflamed and painful I performed a punch operation with a very small basal iridectomy. At the present moment there is barely a trace of the punch hole to be seen: it has healed up solidly and smoothly. The small basal iridectomy seems to have done all that was necessary, for the eye has remained quiet since the operation.

The left eye had a highly suspicious disk. I treated it with miotics for six months, at the end of which period it was obvious that a steady deterioration of the sight had set in, and simultaneously the field began to contract. Finally the Schiötz showed a hypertension of 50*mm* of Hg. It was necessary to operate. It would have been an ideal case for a narrow iridectomy, for the eye was almost normal. V = $\frac{6}{12}$. In an evil moment I decided to punch the eye, which I did on *July 21, 1914*, adding a basal iridectomy. Unfortunately the flap was very thin and a very small triangular tear was detected over the punch hole. Probably in my anxiety to get well forward the punch slightly engaged the reflection of the flap. In consequence the anterior chamber did not show the slightest sign of re-forming for a fortnight. It ultimately reappeared, but for some weeks there was a considerable increase of the myopia. This gradually disappeared, and the final result was excellent. There was only a small raised scar with a central bleb the size of a pin's head. Vision returned to $\frac{6}{9}$, and the tension remained normal. My patient progressed in a completely satisfactory manner till early in June, 1915. While I was away for a few days the eye suddenly became painful, but she took no notice of it for two days although I had warned her to come to me at once if anything abnormal occurred. Ultimately on *June 4, 1915*, about eleven months after the operation, she consulted Mr. Jameson Evans at Birmingham. He found ciliary injection, discoloration of the iris, and posterior synechiæ. The bleb looked healthy and there was no discharge. Atropine and protargol drops were ordered. On *June 8th* there was a thick mucopurulent discharge, which contained no organisms visible in a smear. *June 9th*, still profuse discharge. Pupil dilated. *June 17th.* I saw the patient. There was no discharge, but there was some fine keratitis punctata and peri-keratitic injection. On *July 10th*, I again saw the case. The eye had absolutely returned to normal, and showed no sign subjective or objective of the attack of iritis. Miss F. had had a severe attack of influenza shortly before the iritis started.

The effect of these tragedies has been to alter entirely my opinion about sclerotomy. A year ago I was beginning to be suspicious that the dangers, difficulties, and complications of these new operations were not balanced by an obvious superiority over iridectomy. The statistics referred to above tended to confirm this suspicion. Now I fully realize that the danger of late infection is no myth, no occasional happening; fully twenty per cent. of my sclerotomies have been affected, and I now know from a sad but illuminating practical experience that a patient with a filtering scar may be said to live upon the slopes of a volcano; late infection may befall him at any moment. A slight conjunctivitis is for him a serious disease menacing the very existence of what may be his only useful eye. I am fully aware that I shall be told that most of my cases were punch operations, and that my experience cannot be applied to the other operations. I answer that the outward appearance of the resulting cicatrix is exactly the same for both operations, and sections show no material difference. Again, late infections have been reported by Hill Griffiths and Axenfeld after trephining, and Mr. Evans had one after a wedge isolation operation. The danger is inherent in the filtering scar and I see no way of combating it. In the April number of *Ophthalmology*, Dr. F. E. Cheney on page 45, referring to trephining says: "It is not a simple operation and there are various complications which may arise. *Late infection*, I venture to say, will become more a factor to be reckoned with than may seem probable at the present time. A certain number of such cases have been reported, and it is safe to say that a goodly number have taken place that have not been reported."

We are now in a position to answer the three questions I propounded at the beginning of this paper. We can group them together and say: iridectomy is so successful in acute glaucoma that it is quite unjustifiable to adopt a more complicated method of operating. Sclerotomy is far too dangerous in its remote effects to be the operation of election in even the majority of cases of chronic glaucoma; it should be reserved for examples of the disease in which iridectomy has failed, for cases where, owing to the extreme shallowness of the anterior chamber, iridectomy is technically more difficult than trephining, and for patients whose iris is so atrophic that iridectomy is manifestly futile. It is a great disappointment to feel that I must give up a procedure which has yielded me several excellent results, but, with the reservations mentioned, I feel very strongly that it is not the best primary operation. We can always fall back upon the trephine or punch, but why employ them before the simpler and safer operation has been tried and has failed!

I would finally draw attention to the real danger of a buttonhole, however small, in the flap. This seems necessary because some operators regard such a complication as trivial and one or two perform sclerotomy without cutting a flap at all, among them Dr. Casey Wood.

THE CILIARY GLANDS.[1]

By W. C. FINNOFF, M.D., Denver.

(*With ten illustrations on Text-Plates* XV., XVI., XVII.)

A STUDY of the structures found in the ciliary body is of the greatest interest. For it is presumably from this region that the aqueous humor is secreted. The parts concerned in the formation of this fluid have met with more or less discussion, and many interesting experiments have been performed to learn and to prove that special areas are involved in this function. But when looking over the literature on this subject one is surprised to find that little is at hand.

The experiments of Deutschmann, Schoeler, Uhthoff, Leplat, and Nicati seem to prove that the aqueous humor is secreted by the ciliary body. Nicati (1) claims that the aqueous humor is secreted by the epithelial layers covering the ciliary body from the ora serrata to the root of the iris.

Treacher Collins (2) first described the presence of gland-like processes projecting from the pigment epithelial layer into the substance of the ciliary body. These glands he concluded were concerned in the secretion of the aqueous humor, but he did not assert, as many have said, that they were the sole agents in the production of this fluid. Griffith (3) located gland-like projections which were similar to those described by Collins, but thought that their chief function was to produce the pigment and regulate its amount for this region. Alt (4) found many gland-like processes in the ciliary region, but unlike Collins and Griffith could find no lumen.

Sections of this region can be studied best when bleached,

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[1] Candidate's thesis for the degree of Doctor of Ophthalmology, University of Colorado, 1915.

ILLUSTRATING DR. FINNOFF'S ARTICLE ON "THE CILIARY GLANDS."

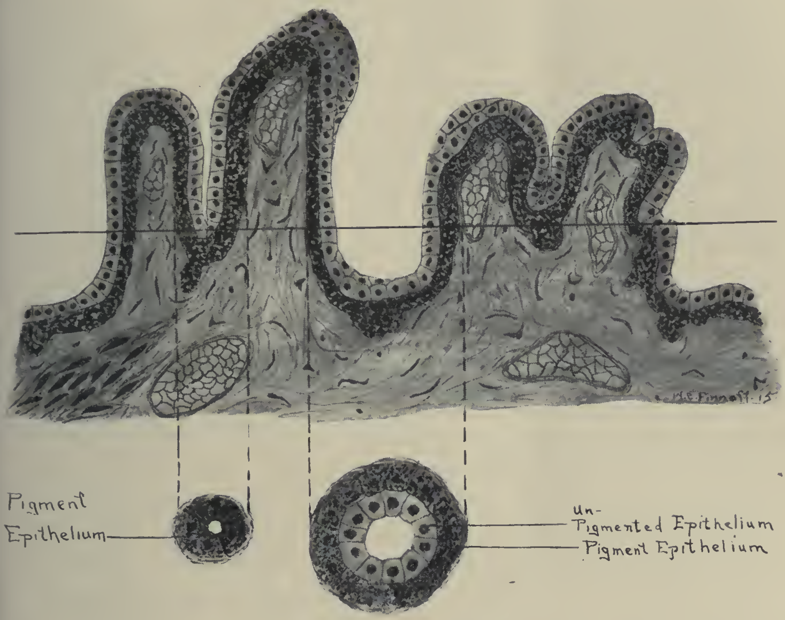

FIG. 1.

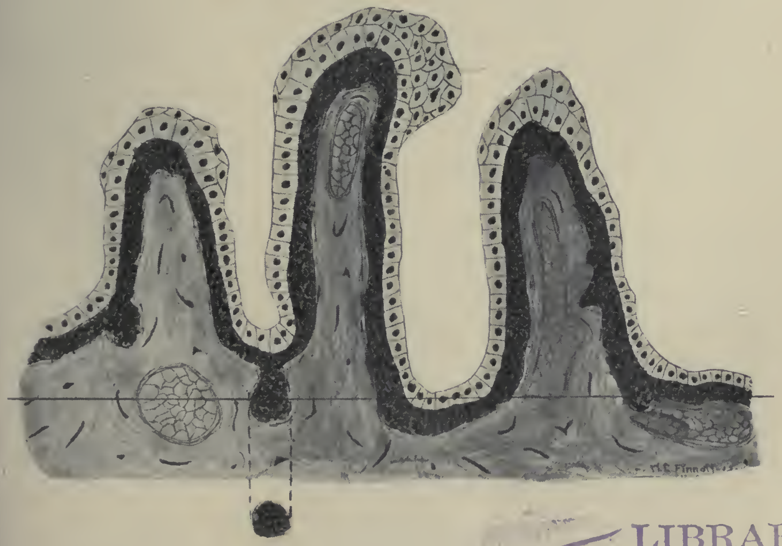

FIG. 2.

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for where the ciliary pigment layer is very prominent it masks many important details. The methods of bleaching will be described under a separate heading.

A study of the development of the ciliary region will be most advantageous at this time. It does not make its appearance in the embryo until later than the other structures of the eye. In the primary optical vesicle we find no differentiation between the layers of the retina and the ciliary body.

It is not until the third month of embryonic life that marked changes take place in the ciliary region and the iris. At this time the cornea and lens have undergone marked changes in development. The first development sign in the ciliary portion of the retina is a thinning out of the retinal layers; this is somewhat abrupt when compared with the thicker retina, and corresponds to what is later termed the ora serrata. The thinned ectoderm is soon replaced by high cylindrical epithelial cells growing in from the edge of the cup. The pigment epithelium also is becoming thicker and more cylindrical with the nuclei placed in uneven rows. At this time a small annular space at the margin of the lips of the cup can be noticed between the inner and outer epithelial layers and is termed the marginal or circular sinus, and is obliterated during the seventh month of fetal life.

During the latter part of the third month the ciliary part of the optic cup is thrown into radial folds, as if by too rapid growth of this portion, and is the "anlage" of the ciliary processes. The mesoderm with its small vessels projects and forms a basement membrane upon which the epithelial cells rest. In the ciliary mesoderm can be seen the beginning of the ciliary muscle, and its fibers show a meridional arrangement. At this stage we see this muscle farther posterior than in adult life.

It is in the fifth month that the ciliary folds increase in size and number and their epithelial coverings become larger and more pigmented, resembling the adult ciliary processes. In the processes and body at this stage, the muscle has increased and formed radial and meridional fibers, but towards the end of the month the meridional fibers predominate and form the true Brücke's muscle. At the latter part of the fifth month the development of Müller's muscle has started; it is first seen in the anterior part impinging upon the root of the iris. The appearance of this muscle increases the size of the ciliary body, and the posterior portion of the body begins to fill the gap between the ciliary body and the ora serrata.

In the seventh month retrograde changes take place. The mesodermal framework atrophies and reduces the space between the anterior chamber and the ciliary body. Brücke's muscle shows no changes, but the Müller muscle increases in size.

The eighth month shows slight increase in the size of the ciliary processes, but not in number. The position of the body is advanced toward the free-chamber angle, and the ora serrata has receded. The muscular portion remains stationary.

There is some growth during the ninth month, but complete development does not take place until some time later, after birth. Both muscles increase in size and come closer together. The ora serrata is now behind the ciliary body and lies in the region of the choroid (5).

The minute anatomy of the ciliary body is described admirably by Hess (6), and his illustrations make clear this complicated ocular organ. Salzmann's (7) book describes very minutely the different structures found in this region, and has many valuable illustrations which will help one in studying the tissues of this body.

The outer layer of the ciliary body is composed of smooth, non-striated or involuntary muscle fibers, having spindle-shaped cells with oval nuclei. The outermost fibers are placed in a meridional direction and form Brücke's muscle, which is subdivided into tensor choroidea or outer portion and the inner radiating fibers. Müller's muscle is found more internally than the Brücke's and runs equatorially; this muscle is the true compressor lentis. The size of the muscle varies in different eyes, being strongly developed in hyperopic and poorly in myopic individuals. These muscles are found coursing from the other portions of the ciliary body to the pigment epithelial layer.

Behind the root of the iris in meridional sections of this region, cross-sections of the circulus arteriosus major are noted. These furnish the arterial blood to this portion of the ciliary body and to the iris. Large veins are not seen; the

ILLUSTRATING DR. FINNOFF'S ARTICLE ON "THE CILIARY GLANDS."

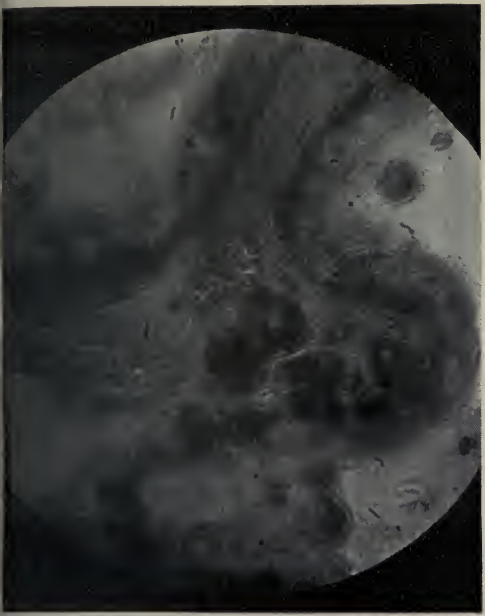

FIG. 3. Showing four pigmented epithelial plugs. The upper one with a light center has a lumen. From bleached section.

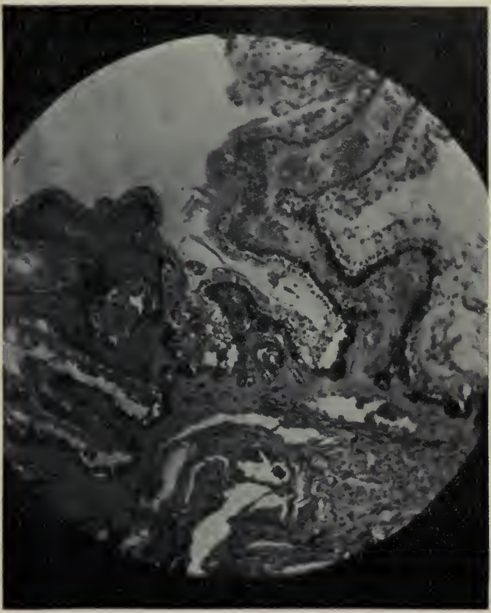

FIG. 4. Showing the relation of the blood-vessels to the pigmented epithelial layer.

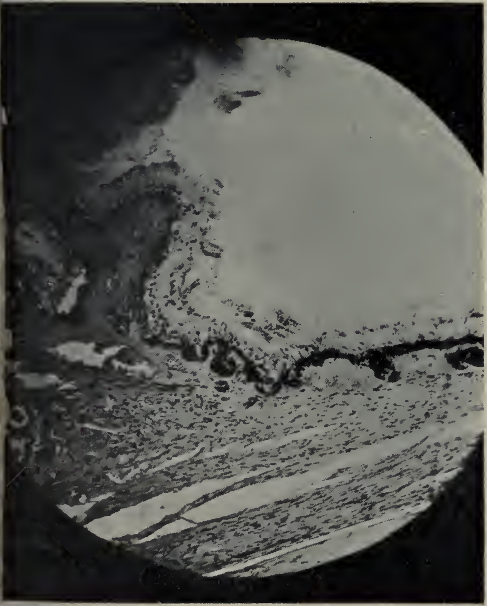

FIG. 5. Small and large plugs of pigmented epithelium protruding into the substance of the ciliary body.

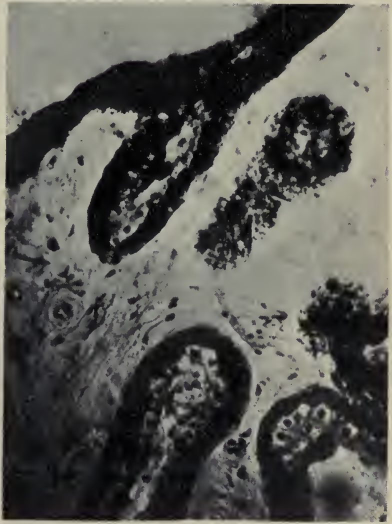

FIG. 6. Isolated oval area of pigment epithelium deep in supporting structure of a ciliary process.

venous blood courses backward through small vessels and passes outward through the sclera by way of the anterior ciliary veins.

The nerves are seen to branch before entering the muscle; they first produce a wide meshed plexus, and break up as they pass on through the muscle. The nerves are medullated, and in the plexus, ganglion and bipolar cells are found; they are probably motor cells for the muscles of this area.

The vascular layer is directly continuous with the layer of the same name located on the choroid. This layer contains veins of varying caliber, which run parallel with occasional anastomosis. Their course is toward the choroid. There are a few small arterial twigs scattered through this layer, but the veins predominate. Most vertical sections will reveal very large oval blood channels, while specimens cut transversely show cross-sections of the vessels.

The vessel layer of the ciliary body is similar histologically to the same layer in the choroid, except that chromatophores are less numerous, and toward the anterior part are almost absent in many eyes.

The ciliary processes contain thickened vessels which give an uneven appearance to the surface, producing the plicæ ciliares and the warts in the valleys. Each ciliary process conceals a richly subdivided framework of wide capillaries and small veins which are supplied by a small artery from in front, and the veins send branches backward into the orbicularis ciliaris.

Within the lamina vitrea choroideæ the elastic lamina is contained. It forms the inner limitation of the vessel layer of the orbicularis ciliaris and the posterior part of the corona ciliaris. This layer is best seen when stained with orcein.

The next layer is termed the interlamellar connective-tissue layer, and is evidently a continuation of the delicate collagenous fibrillæ found between the two layers of the glass membrane of the choroid. When the specimen is stained with Van Gieson's the details of this layer are best seen. It is devoid of blood-vessels, although this layer merges with the blood-vessel layer. The nuclei are elongated and many fibrillæ are present which have a meridional course.

The cuticular lamella covers the whole of the ciliary body as far forward as the root of the iris. It is thickest in its anterior portion, the other being very thin. This layer is continuous with the glass membrane of the choroid and by the older authors is called the glass membrane of the ciliary body.

For an understanding of the various layers of the ciliary body from without in, it is necessary to describe the organ, but the part that concerns us most in this paper is the epithelium. There are two layers: the outer pigmented and inner non-pigmented. There are differences of opinion as to their function, but it is claimed that both layers are concerned in the secretion of the aqueous humor.

The outer or pigmented epithelial layer (pars ciliaris retinæ) is directly continuous with the pigment epithelium of the choroid and consists of a single layer of pigmented epithelial cells. The pigment differs from that of the choroid in that here the granules are larger, and rounded, resulting in a darker appearance of this layer in the ciliary region.

In the various portions of the ciliary region the pigment epithelium is different. Just in front of the ora serrata, in the smooth area, the cells are 6μ broad and 18 to 23μ high, are cylindrical, and have oval nuclei with their long axes placed at right angles to the inner surface of the ciliary body.

The meshes of the reticulum are filled with pigment, the layer of pigmented cells dips into the depressions, and the cells become irregular and polyhedral in form. Invaginations into the outer portion of the ciliary body were first described by Treacher Collins in 1890. Bleached sections were prepared and he found that protruding from the pigment epithelium toward the ciliary muscle were numerous little processes, each composed of cells, which he found on cross-sections to be tubular, and these he concluded were concerned in the secretion of the aqueous humor and the nutrient fluids of the vitreous. In a second article (8) he makes clear that the recesses between the ciliary processes or any of their convolutions were not considered true ciliary glands as seemed apparent from his first description.

The glands which bear his name are definite tubular outgrowths of epithelial cells from the pigment layer only. They are found between the ora serrata and the root of the iris; projecting from the outer surface are numerous processes each

ILLUSTRATING DR. FINNOFF'S ARTICLE ON "THE CILIARY GLANDS."

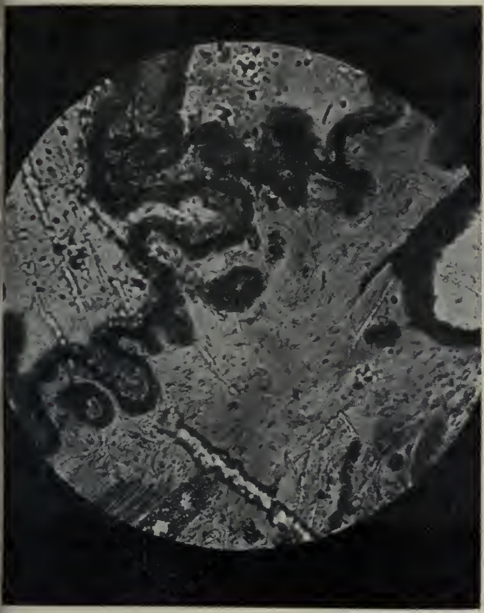

FIG. 7. Ciliary processes and epithelial plugs.

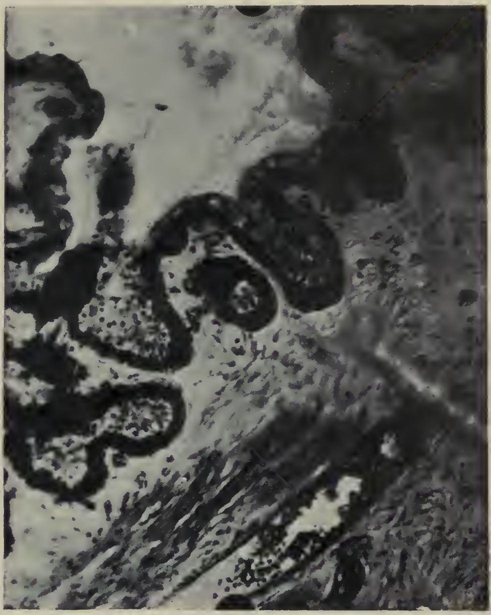

FIG. 8. Area cut transversely, or on the flat. Showing how easily a cross-section of a valley, between the processes, might be mistaken for a gland.

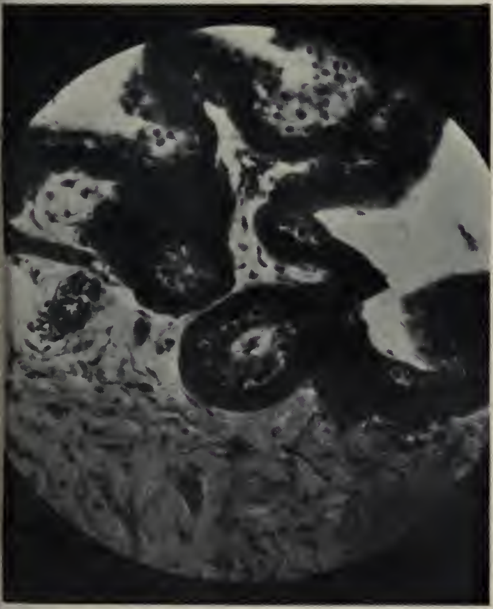

FIG. 9. Showing how both layers of epithelium are frequently found in transverse sections. These areas have somewhat the appearance of glands.

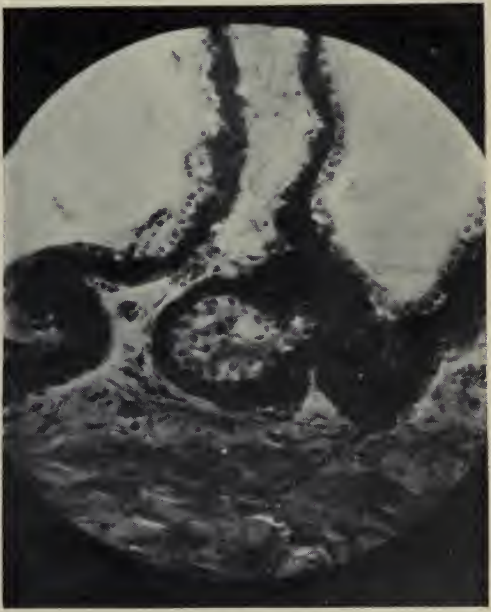

FIG. 10. A protrusion of pigmented and non-pigmented epithelium into the ciliary body. If this area was cut at a lower level, the non-pigment epithelium might not be present and the pigment epithelium could resemble a gland composed of pigment cells.

composed of a group of cells. These vary in size and number in different parts of the ciliary body. Thus in the anterior portion of the plicated part they are small, few, and far apart, confined to the depressions between the ciliary processes, none being situated at their apices. In the posterior portion of the plicated part, at its junction with the non-plicated part, they are the largest, and most numerous. Here they are pear-shaped, connected by the stalks with the epithelial layer, and their rounded ends project toward the ciliary muscle. Many can be made out to have two parallel rows of cells, and a lumen was found by Collins and Griffith but not by Alt. Rutteman (9) examined eighty specimens of eyes for the glands of Treacher Collins; the eyes had been affected by various diseases; some had increased and others decreased tension, and were secured from all ages. He did not find a lumen in any of his specimens and found no branched processes. He attributes the dipping in of the pigment layer to its passing through gland-like processes into the underlying ciliary structure.

In transverse sections Collins found in each projection a small central lumen surrounded by a single layer of pigment epithelium, which rested on a distinct basement membrane. He concluded that they were true glands and were subjected to catarrhal inflammation similar to that seen in glands elsewhere, thus producing the train of symptoms associated with serous iritis, or, as better termed by Mackenzie in 1835, serous cyclitis.

Alt found no lumen in the projections of the pigment epithelium, but sections examined by him were cut meridionally or equatorially; in bleached and unbleached sections his results were the same. Collins (2) suggests that Alt had not examined bleached sections cut transversely. It was in sections cut in the latter direction that Collins was able to demonstrate best the existence of a lumen in the gland-like projection.

There are several methods of bleaching the pigment epithelial layer, but all are difficult and require much patience. Good sections before the bleaching reagent is applied are apt to become very brittle and hard to handle without breaking, after the solutions have been used.

The most satisfactory results are obtained with chlorine water. The technique is as follows: After the tissues have been hardened, dehydrated, impregnated with celloidin or paraffin, and blocked, they are cut and the sections are exposed to chlorine water for twelve to twenty-four hours or longer if they are not thoroughly decolorized. The sections are then stained in the usual way, dehydrated and clarified before covering with Canada balsam.

Another handy method is the use of hydrogen peroxide instead of chlorine water. The sections are subjected, first to ten per cent. alcohol, next to distilled water for a short time, and then exposed to peroxide of hydrogen from twenty-four to forty-eight hours in sunlight if possible.

Fick (10) recommends a saturated solution of bichromate of potash three parts to one part of dilute sulphuric acid as an excellent and satisfactory bleaching agent. Sections in a cold solution are bleached in three-quarters of an hour, and a shorter time is required if the process is carried out at a higher temperature. My most satisfactory results have been obtained by subjecting the sections to this solution at room temperature for twelve hours. This method is very satisfactory, for celloidin sections are not made brittle and are easily handled and stained after bleaching.

Internal to the pigment epithelium, we find covering the whole of the ciliary region a layer of epithelial cells which in the posterior portion are comparatively free from pigment, but as we follow this layer forward we find a very gradual transformation to pigmentation of the cells, without a definite line of demarcation. The gradual pigmentation gives the anterior portion near the root of the iris a darker color than the posterior portion covering the ora serrata.

This layer is composed of cells which vary from cylindrical to cuboidal. Behind the cells are cylindrical, measuring 6 to 9μ broad and 30μ high, with elongated nuclei situated in the outer portion of the cell, but as we follow them forward the cells become more cuboidal, being 12 to 15μ broad and only 10 to 15μ high with rounded nuclei located near the center of the cell. At the apices and in the bottom of the valleys formed by the ciliary processes, several layers of epithelial cells are seen. The striated appearance is especially striking at the apices of the processes in some sections.

The internal limiting or glass membrane is the innermost layer of the ciliary body. It is directly continuous with the internal limiting membrane of the retina. It is a structureless membrane resembling a clear coagulated fluid, which dips into the intervening gaps and spaces, but plays no part in secretion of the ocular fluids.

To the outer pigmented and inner non-pigmented layers, especially the portion which covers the ciliary processes and the valleys between them, Nicati (1) gives the name of aqueous humor or uveal glands. He divides it into two portions, the posterior extending from the ora serrata to the root of the ciliary processes, and the anterior, of much more importance, following the folds of the ciliary processes to the root of the iris.

Nicati explains the secretion of the humor from this region as follows: the ciliary epithelium rests upon a layer of vessels which are expansions of the chorio-capillaris, and its nutrition is found to depend on these vessels as a whole. He claims that the capillaries are contained between two impermeable walls, the internal vitreous lamina within, the external limiting membrane without. When serum transudes from the capillaries it cannot escape through the walls of the sac, but must find its way out in front where, through disappearance of the vitreous lamina, the sac lies open to the glandular epithelium of the ciliary region. For this reason the chorio-capillaris has been called the source of the aqueous humor.

Experiments prove that the aqueous is secreted by the ciliary body, but at present nothing has been either proven or disproven, that the so-called glands described by Collins are concerned in this process.

The fluid in the anterior chamber contains no albumin, but after tapping and withdrawing the aqueous that which is then secreted contains it, and when this fluid is examined under the microscope fibrin is found. This tends to prove that fluid which is formed rapidly is a transudate from the blood-vessels which lie close to the surface of the ciliary body, rather than a secretion from that organ.

Injection of weak solutions of fluorescin into the circulatory system at varying intervals will not color normal aqueous, but after the withdrawal of the fluid that which refills the anterior chamber becomes colored. Examination of eyes from which the aqueous has been withdrawn and allowed to refill with the colored fibrinous fluid reveals the following: aqueous of the anterior and posterior chambers is colored, but the walls of the chambers are not impregnated with the stain; the vitreous, lens, and retina proper are unstained, but the surface of the ciliary processes and the chorio-capillaris are strongly stained. The surface of the epithelium is unstained, but the substance between the cells is strongly colored.

These observations are taken from Nicati's experiments and seem to prove almost conclusively that the aqueous comes from the ciliary body. When filled rapidly it is apparently a transudate rather than a secretion, for if the fluid was secreted by the epithelium we would find the cells colored by the staining solution which had been injected into the circulatory system prior to the evacuation of the aqueous.

The epithelial cells of the ciliary body in the normal eye undoubtedly take some part in the transformation of the fluid portions of the blood into the aqueous humor. The pigment layer, it is claimed, plays the most active part in this process. This is a reasonable conclusion, because these cells lie immediately internal to the layer of blood-vessels, but before the fluid can reach the chambers of the eye, it must pass through the layer of unpigmented epithelium. It is reasonable to suppose that these cells further change the fluid and release it as pure aqueous humor free from fibrin in the normal eye.

The secretion of fibrin-laden aqueous is a reflex act produced by lowering of tension in the eye and reflex stimulation of the sympathetic nerves. Irritation of the iris stimulates the secretion probably through the sympathetic system.

Inhibition of secretion is dependent upon the fifth nerve. Stimulation of this nerve or the Gasserian ganglion diminishes the secretion, while severing it in front of the ganglion is followed by a more rapid flow. Removal of the iris is also inhibitory to the secretion of the ocular fluids.

Ten human and several sheep's eyes were examined. In bleached and unbleached sections projections of the pigment epithelium into the deeper portions of the ciliary body were found in most specimens. They extended from the ora serrata to the root of the iris and were more numerous in some eyes than in others.

Sections were made from eyes which were cut equatorially, meridionally, and transversely across the ciliary body. Several specimens from each eye were studied to note the differences in arrangement of the structures at the various levels of the body. They were examined very carefully with the 16*mm*, 4*mm*, and 1.8*mm* oil-immersion lenses. A lumen was found in the projections of pigment epithelium in only one specimen. The section was one that had been bleached and unfortunately had not been washed long enough in water after being removed from the bleaching reagent and contained enough of the solution to partially bleach the stains which were used in coloring the specimen. It is for this reason that the photo-micrograph of this area, which was taken with an oil immersion lens to give as much magnification as possible, is so hazy and indistinct.

It seems that the presence of a gland-like structure composed of pigment epithelium, situated deeply in the substance of the ciliary body, is highly improbable. If the projections from the pigment layer were glands, ducts would have been found piercing the unpigmented epithelium to give an outlet to the fluid which had been secreted by the gland cells. It does not seem logical to have this an internal secretion, which in some unknown way flows from the glands located deeply in the ciliary body into the chambers of the eye.

As mentioned before, the pigment epithelium undoubtedly plays some part in secretion of the aqueous. The isolated pigmented plugs with or without a lumen probably have the same identical action as that which does not dip deeply into the substance of the ciliary body. And they can be called glands only in the same sense as the other pigmented epithelium of this region.

The most probable explanation for the presence of a lumen in the center of the pigmented epithelial cells is that, during the process of fixing and hardening, the tissues become more or less contracted with a pulling apart of some areas. If this takes place in or near an epithelial plug the cells would contract and the result would be an artefact resembling a lumen. Cross-section of this would look like a tubular gland cut crosswise. This phenomenon has come under my observation many times, in preparing and examining tonsillar crypts.

Another possibility for this appearance is that, in cutting sections transversely, or on the flat, the valleys between the ciliary processes had been cut at the junction of the pigmented with the non-pigmented epithelium, and the appearance of a lumen obtained. Fig. 1 is a diagram drawn in an attempt to explain more clearly this theory.

A third theory which has been proposed by others is that muscular contraction has thrown the epithelial layers into folds and the pigment layer has projected into the substance of the body at the time of hardening.

Figure 2 shows how cross-sections of this region might resemble tubular glands cut crosswise. An area as represented in the illustration seems to have a duct, but in all sections examined no lumen was found in any of them and all seemed to be a simple dipping in or thickening of the pigment layer.

The presence of the so-called glands of Treacher Collins is doubtful, and when seen with a lumen, as stated above, are probably artefacts. The aqueous humor and nutrient fluid of the vitreous are probably secreted by both layers of epithelium, which cover the ciliary body from the ora serrata to the root of the iris. The pigment epithelium probably plays the most active part because of its location. It is close to large and numerous blood channels (Fig. 3). The serum is probably partially changed by the outer layer and completed by the inner non-pigmented epithelium in the normal eye.

The photo-micrographs were taken by Dr. R. C. Whitman of the University of Colorado, to whom the author is much indebted for his kindness, in permitting him to do much of his work in the University laboratory.

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MALIGNANT UVEITIS TREATED WITH THYROID EXTRACT.[1]

By JAMES BORDLEY, Jr., M.D., Baltimore, Md.

(*With one text-illustration and five charts of the visual change*)

THERE are several well recognized varieties of uveitis, ranging from the mild form seen as an evidence of senility to the malignant chorio-cyclitis. As the cases which are to be considered here belong to a rather rare form I shall speak of their symptomatology.

Except for intensity, the symptoms were the same in all of the patients. The course of the disease was slowly progressive. The first evidence of trouble was photophobia; this was followed by loss of visual acuity. Coincident with the failure in vision, exudates appeared on the posterior corneal surface. These exudates were of two forms: small dots located near the inferior border, in places becoming confluent and forming irregular masses; and large plaques with a dense opaque center and translucent edges. The latter seldom exceeded four or five in number and frequently disappeared, leaving scar tissue to mark their former location.

Dilatation of the pupil and a greenish discoloration of the base of the iris were early symptoms. The discoloration of the base we regarded as an atrophy, as the iris apparently never regained contractility and reacted neither to light nor accommodation. When the conjunctiva was closely studied by oblique illumination and magnification a large number of cysts were found in the bulbar portion, encroaching in places on the epithelial layer of the cornea.

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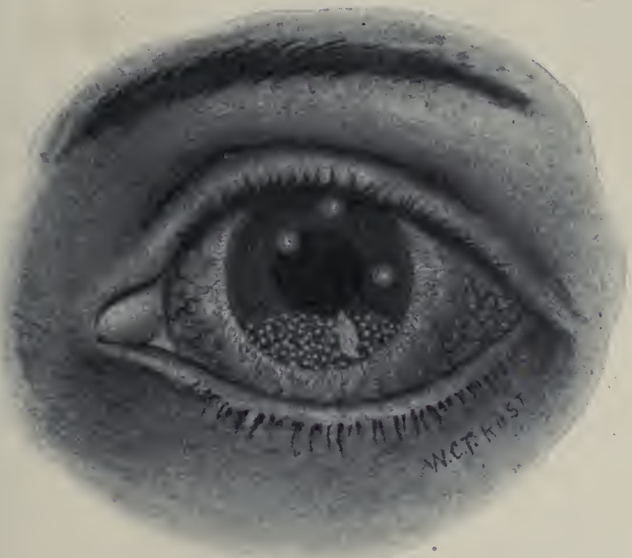
[1] Read at meeting of Am. Ophth. Soc. at New London, Conn., July, 1915.

The formation of the vitreous cloud in the cases watched from the start of the disease was very curious. It looked at first not unlike a thin, dotted veil suspended in the vitreous chamber. The mesh of the veil became more and more coarse and the dots larger and larger until the whole formed a homogeneous translucent mass filling the chamber and obscuring the retina.



Exudates on the Cornea.

In one case the optic disk was slightly hazy, and in all five engorgement of the retinal veins was noted. The intraocular tension, at first normal (about 20–25), increased as the disease advanced, in one case reaching forty-five. There was in every instance a secondary decline, dropping in two cases to five.

All of the patients complained bitterly of photophobia, the eyes were tender to touch, and there was limited injection of vessels of the deep circumcorneal zone. The fields of vision were, until dimmed by vitreous haze, normal.

A careful physical examination was carried out in all of these patients by eminently qualified internists and in not one was a lesion found in any of the so-called vital organs. Wassermann tests were made in every case by Dr. Albert Keidel who is in charge of the Department of Syphilis at the Johns Hopkins Hospital. The results of his work will be taken up in the case reports.

In every case there was a positive tuberculin reaction; the von Pirquet and injections of "old" tuberculin were both used. In three of the patients, the reaction to "old" tuberculin was very marked both constitutionally and in the diseased eye. In all, the percentage of hæmoglobin and the red-cell count, indicated anæmia. The kidney functions were normal and in but one case did we discover albumen. The mouth, nose, and throat of every case were carefully studied and X-ray pictures made of the teeth and nasal sinuses.

The treatment of the ocular condition of these patients included: mercury, iodide of potassium, pilocarpine, and sweat baths. As a positive tuberculin reaction, a low-grade afternoon temperature and loss of weight had to be considered in each instance; fresh air, milk, eggs, and rest were insisted upon. Subconjunctival injections of sodium chloride and bichloride were given without the slightest apparent improvement except for the relief of pain.

There was one medicine used the results of which so impressed all of the physicians associated in the treatment of these patients that I feel justified in calling it to your attention. I speak of thyroid extract. A fairly large and by no means pleasant experience in the treatment of malignant uveitis has convinced me that in these cases we have to deal with two factors: an infection, and an eye that makes a strong defensive, but lacks the something necessary to an offensive, fight. Wishing to test this hypothesis, I started several years ago to feed patients suffering from uveitis with extracts of various tissues of the eyes of sheep, hogs, and calves. The sum of these experiments was failure to accomplish anything. Still having faith I fed patients on the chemicals necessary for tissue upbuilding and with no more success. It was about this time that I was fortunate enough to see a patient who, with malignant uveitis and a positive Wassermann, resisted the most strenuous antisyphilitic treatment. This patient also had patches of thickened skin, was morose, and suggested the possibility of a rather atypical myxœdema. Thyroid extract was ordered with a hope that it might be of help in the treatment. The change for the better was so immediate and striking that it prompted me to make a search for patients with outspoken hypothyroidism. I had the privilege of examining a fairly large number of such cases and found two with active uveitis, and four with lesions clearly the result of former malignant uveitis. I also ran across the history of another case in which, following a thyroidectomy, "extensive vitreous changes" made their appearance. This latter case interested me very much, because, with the introduction of thyroid extract, made necessary by other symptoms, the vitreous opacities disappeared. That my observations were not the first to point to the relationship of hypothyroidism and uveitis is made quite clear by an article on the subject by Demets.

I do not wish it inferred from what I have said that I believe that malignant uveitis is necessarily a symptom of cretinism or myxœdema. My own experience has left quite a different impression; indeed I have seen one case—a patient of Dr. Howard Kelly's on whom a pan-hysterectomy had been performed—resist all thyroid treatment and clear up only after taking ovarian extract for about two months, and another patient who responded neither to thyroid nor any other treatment. My only idea in presenting this subject is to get before you the successful results of the use of thyroid extract in patients suffering from the type of malignant uveitis which I have above outlined.

In all, eight patients have been treated: four with marked success, two must be classed as doubtful, and two as failures. Of this number I am able to discuss only five, as the records in the other cases are not yet completed.

The charts to be shown will illustrate the effects on vision, and I can assure you that the vision was a good index of the progress of the disease.

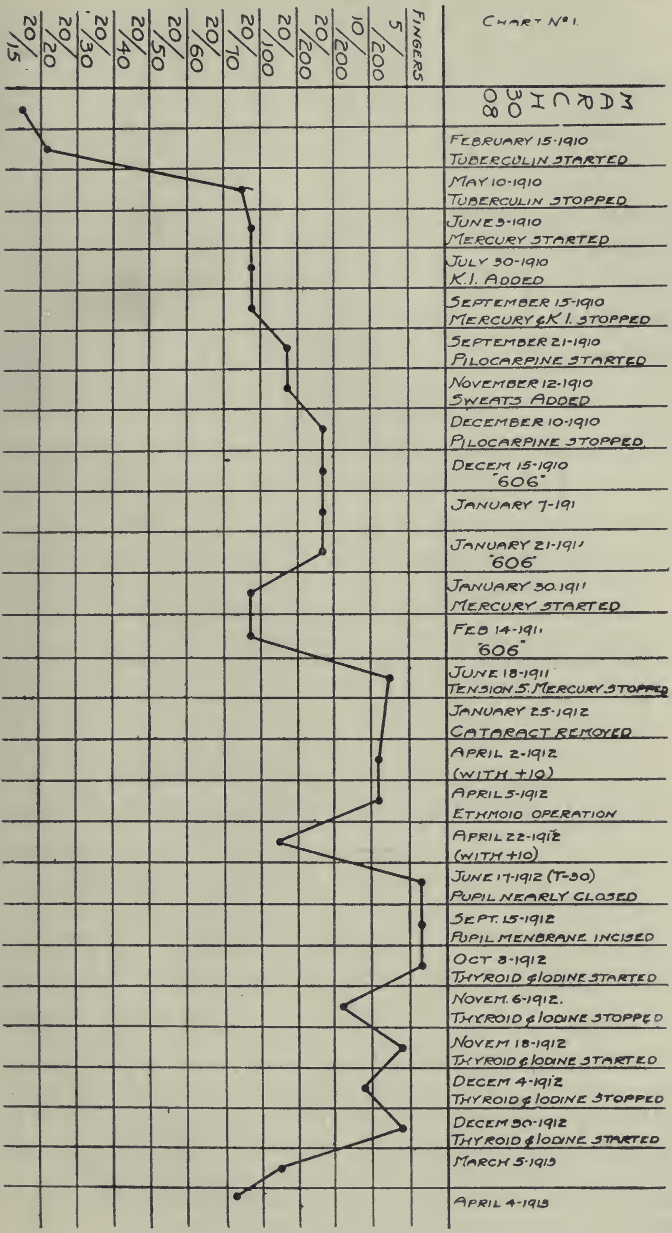
Case 1 (Chart 1.)—The first patient to whom I wish to call your attention was a woman, aged 45, who in spite of treatment lost both eyes. The left eye was first affected, and in 1907 she presented herself with a history of decline in vision in the eye following a severe attack of tonsillitis and rheumatic fever in 1906. She had all the symptoms outlined above in a very tense form, the vision was reduced to counting fingers, and the tension was noted as high normal. A physical examination made by Dr. T. R. Brown was negative and tuberculin reaction positive. The teeth and tonsils were removed and the latter were examined for evidences of tuberculosis, but without success. Injections of salicylate of mercury were given and the patient sent to the mountains. The disease progressed and the patient was brought home, given pilocarpine and sweat baths without obtaining any benefit. The tension of the eye gradually declined, the pupil became closed by an exudative mass, and in spite of operations and medicines the eye was lost.

After a lapse of three years the right eye became affected and developed the same malignant type of uveitis as the left. As the treatment of the first eye had utterly failed, it was determined to adopt a different line of procedure with this second eye, so small doses of tuberculin were given for three months, most of which time the patient was kept in bed and gorged with milk and eggs. During this period the eye steadily lost ground both objectively and subjectively so it was thought unwise to continue the tuberculin. Courses of mercury, pilocarpine, and later salvarsan were instituted. No improvement was noted except from the last, and this was only transitory.

During the first months the tension was "high normal," then a steady decline was noted, the tension falling as low as five.

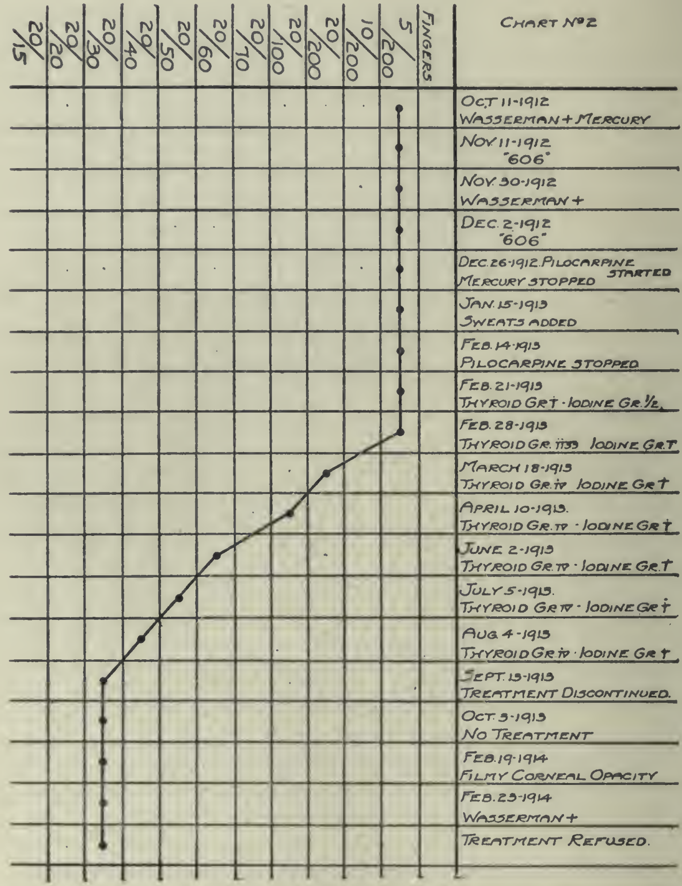
After being under constant observation for fourteen months she drifted away and sought consolation and assistance of "Christian Science." Some months after, she again came for consultation. It would be hardly fair to say that the fully mature cataract which she then had resulted from the efforts of the "healer," but whether this was so or not it necessitated an operation, which, as was to be expected, helped but little.

In October, following the cataract operation in January, thyroid extract in one-grain doses was given twice a day. The vision improved sufficiently in one month to enable her to come to my office alone. Unfortunately in spite of the gain in vision the thyroid had to be from time to time discontinued on account of loss in weight and strength, and eventually had to be given up as a point was reached where fainting attacks and palpitation became alarming. At the


20/15
20/20
20/30
20/40
20/50
20/60
20/70
20/100
20/200
10/200
5/200
FINGERS
CHART No. 1.
MARCH 30 08
FEBRUARY 15-1910
TUBERCULIN STARTED
MAY 10-1910
TUBERCULIN STOPPED
JUNE 3-1910
MERCURY STARTED
JULY 30-1910
K.I. ADDED
SEPTEMBER 15-1910
MERCURY & K.I. STOPPED
SEPTEMBER 21-1910
PILOCARPINE STARTED
NOVEMBER 12-1910
SWEATS ADDED
DECEMBER 10-1910
PILOCARPINE STOPPED
DECEM 15-1910
"606"
JANUARY 7-191
JANUARY 21-1911
"606"
JANUARY 30.1911
MERCURY STARTED
FEB 14-1911
"606"
JUNE 18-1911
TENSION 5. MERCURY STOPPED
JANUARY 25-1912
CATARACT REMOVED
APRIL 2-1912
(WITH +10)
APRIL 5-1912
ETHMOID OPERATION
APRIL 22-1912
(WITH +10)
JUNE 17-1912 (T-30)
PUPIL NEARLY CLOSED
SEPT. 15-1912
PUPIL MENBRANE INCISED
OCT 8-1912
THYROID & IODINE STARTED
NOVEM. 6-1912.
THYROID & IODINE STOPPED
NOVEM 18-1912
THYROID & IODINE STARTED
DECEM 4-1912
THYROID & IODINE STOPPED
DECEM 30-1912
THYROID & IODINE STARTED
MARCH 5-1913
APRIL 4-1913

time the extract was stopped the vision had improved from counting fingers to $\frac{20}{70}$, and it was indeed discouraging, to say the least, to return to mercury and watch the eye become blind.

Case 2 (Chart 2).—The next patient, a girl of nineteen, noticed a decline in vision starting about June, 1912. She was first seen October 8th of the same year; she then had a double chronic ethmoiditis, a positive Wassermann, and a positive tuberculin reaction. The conjunctiva of the left eye was somewhat congested and filled with small cysts, many dots were to be seen on Descemet's membrane, the



base of the iris was greenish in appearance, the pupil semi-dilated and did not respond to light, and the vitreous was a dense black mass.

As a physical examination made by Dr. T. R. Boggs and a gynecological one by Dr. Guy L. Hunner gave us no additional help, the patient was given mercury and salvarsan, but without benefit, for two months. Pilocarpine and sweat baths were used for two months without hindering the progress of the disease or easing the pain. She was then given small doses of thyroid extract and iodine, and as they were well borne the dose was increased to four grains of thyroid and one grain of iodine per day. After reaching the maximum dose it was necessary now and then to discontinue this treatment for short periods. Its effect on the progress of the disease can briefly be described by saying that her vision from February to September increased from $\frac{5}{200}$ to $\frac{20}{70}$, the vitreous cleared, and all inflammatory signs disappeared, leaving only a small corneal opacity the result of organization of one of the large exudative masses on the posterior surface of the cornea.

On June 21, 1913, her ethmoids were opened and polypoid tissue removed. This did not, so far as could be told, materially influence either the eye changes or the vision.

Practically two years have elapsed since the thyroid was discontinued and in spite of a positive Wassermann she has had no return of her trouble. Unlike the first patient, she steadily improved in health and weight while taking the thyroid.

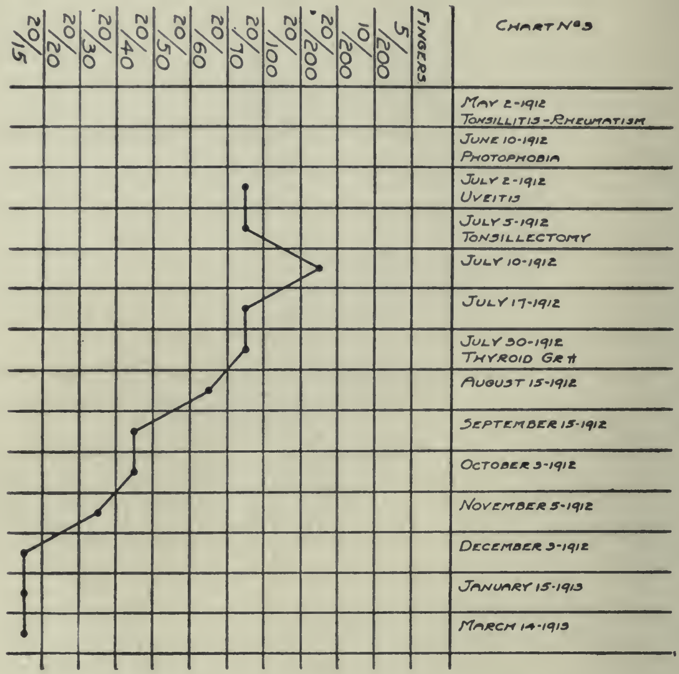
CASE 3 (Chart 3).—The third patient, a nurse in the Johns Hopkins Hospital, following an acute attack of tonsillitis and rheumatic fever, developed within one month intense photophobia and a "red eye." She was in Canada on her vacation and did not report for examination until the vision of the offending eye, the left, had been much impaired.

A physical examination was made by Dr. W. S. Thayer, but nothing was discovered except "suspicious tonsils." Wassermann test was negative and tuberculin reaction positive.

There was slight ptosis of the upper lid, marked deep circumcorneal injection, cysts in the conjunctiva, discoloration of the base of the iris, dots on the posterior corneal surface, semi-dilated and non-responsive pupil, and vitreous opacities.

She was placed in the hospital and her tonsils removed. Time was given to watch the effect of the operation. At first the vision and ocular condition became worse, then a reaction set in which resulted in an improved condition.

When the vision had reached a point, and that far from normal, it became stationary, so twenty days after the operation thyroid extract was given. Following this there was a slow but gradual improvement until the vision became normal. The patient gained in weight and health and now, two years later, is a robust woman with nothing to show for her former eye trouble except a drooping lid.

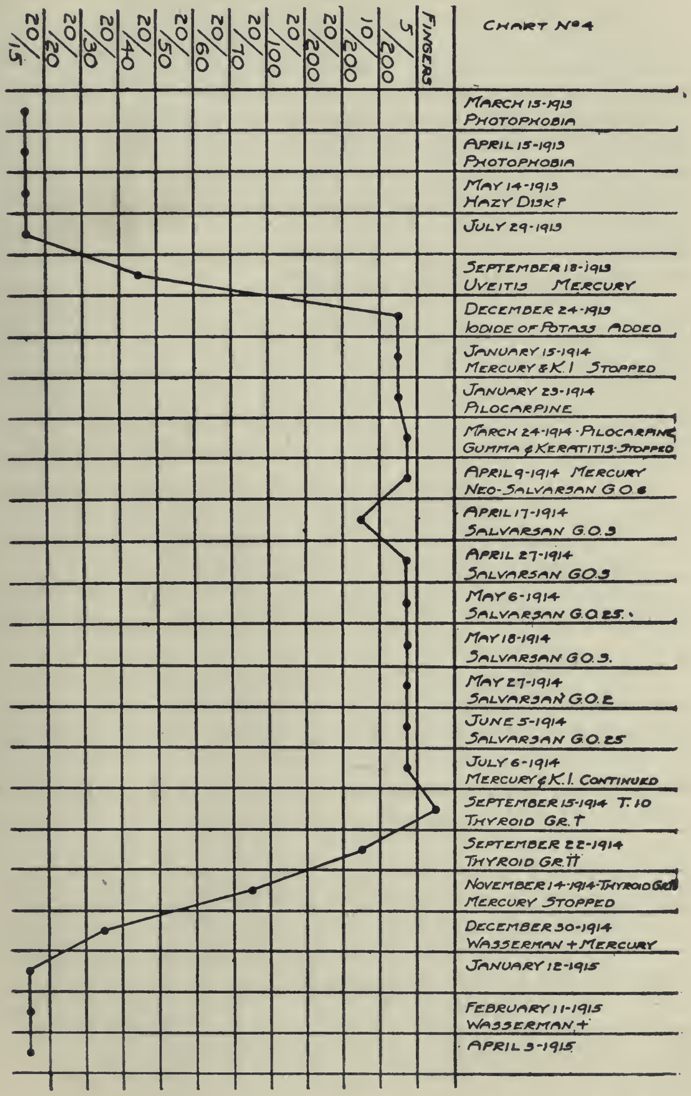


CASE 4 (Chart 4).—It is seldom that we see the first manifestations of congenital syphilis at the age of twenty-six, but in the fourth case of this series such a condition obtained.

The patient, a rather frail anæmic woman, complaining of persistent photophobia of the left eye, came for a consultation. I could find nothing to account for her distress, nor could Dr. Thomas Futcher to whom she was referred for a physical examination. She was kept under observation from March until July; during that time an abscessed tooth was extracted and a slight error of refraction was corrected.

Returning from my vacation on September 15, 1913, I found she had developed a definite uveitis of the left eye.

There were exudates on the posterior surface of the cornea, circumcorneal injection, a cloudy vitreous, conjunctival cyst,



a greenish discoloration of the base of the iris, and vision $\frac{20}{40}$. She was given mercurial injections and iodide of potassium for four months, and, as there was no improvement in the ocular condition, pilocarpine was substituted and continued for two months. About the first of March, 1914, she contracted what her physician, Dr. Albert Chatard, supposed to be the influenza which was quite prevalent in Baltimore at that time. She was confined to her bed for several days and to her home for nearly two weeks. After convalescence, a purulent nasal discharge persisted and a small tumor of the left inferior turbinate, involving the floor of the nose, was discovered. She was referred to Dr. Keidel for Wassermann test, which proved positive. After blood of the husband and baby was tested and proven negative, the mother was confronted with the facts and confessed that her husband, whom she had divorced, infected her with syphilis three months prior to our patient's birth.

At the time the gumma—which the nasal tumor proved to be—was discovered, a slight cloud was noted in the interstitial tissue in the upper portion of the cornea. In spite of salvarsan and mercurial injections the corneal condition developed into a well defined luetic interstitial keratitis. The vitreous became more cloudy and the iris much inflamed.

She was given seven injections of salvarsan between April 9 and June 5, 1914. Her nasal condition cleared up rapidly but her eye symptoms persisted. Dr. Keidel was then obliged to discontinue the salvarsan "because of severe immediate reaction of so-called anaphylactic type." Mercury however was persisted in as the Wassermann reaction remained positive.

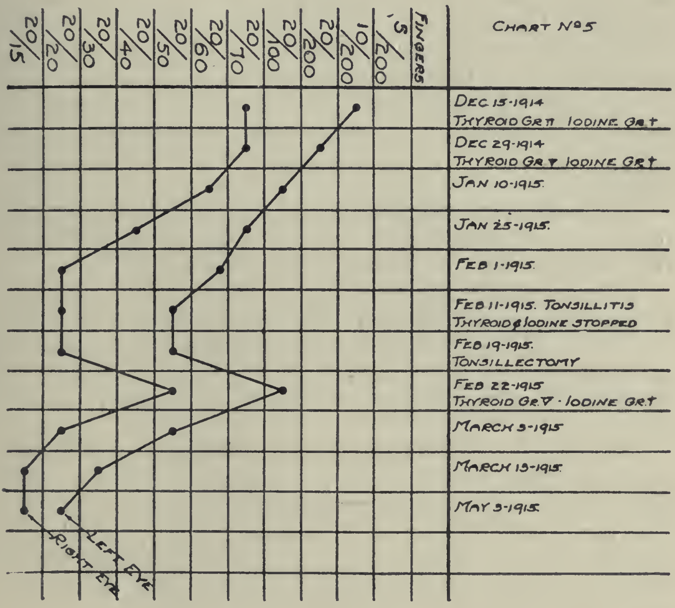
On September 15, 1914, the patient was still suffering very acutely and the interstitial keratitis was no better. At this juncture she was given thyroid extract, starting with one grain a day. Within a week there was a marked change for the better, and as she tolerated the thyroid perfectly the amount given was increased to two grains a day. The subsequent improvement in her vision and ocular disease was so consistent and rapid that I feel it must be attributed to the thyroid extract. Certainly it was not the salvarsan nor mercury alone which resulted in her recovery, because while the Wassermann remained persistently positive the vitreous cleared and the vision returned to $\frac{20}{15}$.

This case suffered both from uveitis and interstitial keratitis, nevertheless I feel it can be classed with the other cases which form the basis for this communication.

Case 5 (Chart 5).—The last case of which I wish to speak is a married woman aged twenty-four. She was sent by Dr. James S. McLester to Dr. W. S. Thayer and by him referred to me. To quote from Dr. McLester's history of the case: "At six or seven years of age Mrs. C. had an enlargement beneath the angle of her jaw, believed to be sublingual adenitis. . . . At thirteen, while having dental work done, a rather alarming cervical adenitis involving the glands of both sides appeared. . . .

"The patient has been married two and a half years and has had two miscarriages. . . . This was believed to be due to some uterine disorder. . . .

"In the latter part of March, 1914, the patient became languid and had some fever. On the sixth of April there appeared a swelling in the parotid region of either side. . . .



There was little pain (but fever), and she remained in bed about six weeks.

"About two weeks after the appearance of the adenitis, double conjunctivitis was noted and, a little later, marked dilatation of the left pupil. She was examined by an oculist who noted double-sided retinitis. At first the vitreous was clouded, but this later cleared up. . . . She lost considerable weight during this illness.

"On June 28th . . . the lungs were negative, as was the heart. The blood pressure was normal. She was seen about this time by another oculist who reported double neuro-retinitis and was strongly inclined to regard this as luetic.

"Her hæmoglobin was 70%, the leucocytes were 9,500. . . . The large number of eosinophiles suggested Hodgkin's. The feces were examined for ova with negative results. The urine showed albumen but no casts. The phthalein test gave normal values.

"A Wassermann test was negative. She was given mercury hypodermically and another Wassermann test was done, which also was negative. . . . In spite of the negative Wassermann, we gave Mrs. C. mercury.

"She improved distinctly for a while, though the fever never disappeared and we were never entirely satisfied regarding her eyes.

"Found two badly diseased molars. These were removed and distinct but incomplete improvement followed.

"Dr. Bunting could not be reached and some smears were sent to Dr. Yates, . . . who wrote: 'Suggestion of Hodgkin's, provided tuberculosis and acute adenitis could be excluded.'

"An enlarged gland just above the clavicle appeared, was removed, and sent to Dr. Bunting. He wrote: 'The condition is one of chronic hyperplastic tuberculosis.' . . .

"She was sent to visit her mother in Mississippi and hygienic measures advised. On her return a few days ago we found the general condition satisfactory, but the eyes no better, . . . particularly in view of a rather large exudate in the anterior chamber. I advised tuberculin therapy.

"One thing I don't feel entirely satisfied about: Her teeth probably play a rôle in this . . . and we have not followed up this clue as persistently as might have been done."

I have nothing to add to this history so thoroughly written by Dr. McLester. I might supplement his statement by saying that repeated Wassermann tests were in our hands negative and tuberculin tests positive.

The eyes were both involved in what we consider an undoubted malignant uveitis, as there were circumcorneal injection, exudates on Descemet's membrane, semi-dilated and non-responsive pupils, the base of the irides were of a greenish color, and the vitreous filled with opacities. The vision in the left eye was $\frac{10}{200}$, the vision of the right $\frac{20}{70}$. The fields were normal and tension was fifteen in each eye. She suffered very much from photophobia and the eyeballs were painful to the touch.

Dr. Thayer confirmed the report of anæmia and suggested that we look for possible points of infection.

The patient was given thyroid, one grain a day, gradually increased to four grains. She was, at first, given occasional doses of pilocarpine and hot-pack sweat baths.

Her improvement, both physical and ocular, was prompt and steady until the development of a mild follicular tonsillitis brought it to a stop. Still even during this infection there was no loss.

As soon as thought safe the tonsils were removed by dissection. At first this appeared a tragedy from an ocular standpoint: her vision greatly declined, the photophobia and pain increased, and the exudates on the cornea greatly multiplied. After a lapse of three days, however, the thyroid, which had been discontinued, was renewed and from that time on there was rapid improvement in the disease until the vision became normal.

Some of the dots on Descemet's membrane in the left eye persisted for several weeks and a systematic examination of her teeth was made by Dr. C. J. Grieves who reported: "One tooth, the first lower right molar, with a gold cap has a blind abscess and should be extracted."

After the extraction of this tooth there was a decided decrease in the Descemetic dots in the left eye, and, in a letter just received the patient says: "My eyes are much stronger and can stand the light; look natural, and my vision is perfect. I have gained thirty pounds."

The only drugs given this patient were thyroid extract and iron. She could not tolerate atropine.

GRAM NEGATIVE DIPLOCOCCI OCCURRING IN THE CONJUNCTIVAL SAC

By ROBERT BLUE, M.D., Chicago.

RECENTLY there came under my observation the case of a girl showing the clinical symptoms of a mild conjunctivitis, the smears from whose conjunctiva showed an abundance of Gram negative diplococci as the most striking feature of the microscopic picture.

The investigation carried on at that time to determine the nature of these organisms suggested the topic of this communication.

Let us approach the subject from the standpoint of the clinician. We have before us a slide poor in cellular elements; it is strewn with a generous sprinkling of Gram negative diplococci, the number of which in proportion to the small amount of secretion is strikingly great; they lie for the most part outside of the leucocytes; there are present also a few Gram positive cocci and Gram positive bacilli which we accept on staining and morphologic grounds as staphylococci and xerosis bacilli. The very appearance of the slide is suggestive of a bacteriological diagnosis. This however is precluded in view of possible error without further evidence.

A loop of the material from the conjunctival sac is therefore transferred to tubes of hydrocele agar and Loeffler's blood serum and incubated for twenty-four hours. Following this technique the case under consideration showed a good growth on both media used. Staining showed this growth to consist of Gram negative diplococci and pseudodiphtheria bacilli By plating and subculturing pure cultures of the Gram negative diplococci were obtained.

This organism grew on agar, ascites agar, and Loeffler's blood serum in the incubator and at room temperature. Wrestler's media remained unchanged and none of the sugars were fermented. These characteristics we deemed sufficient to identify the organism as the micrococcus catarrhalis.

What described organisms shall we consider as included within the limits of variability of the micrococcus catarrhalis?

Before answering this question allow me to remark parenthetically that a paper bearing the title superscribed to this one might perhaps more properly begin with a discussion of the gonococcus, both from the standpoint of historical sequence and from the fact that for many years all Gram negative diplococci occurring on the conjunctiva were regarded as gonococci. Even as recently as 1908 it was necessary to controvert the opinion of Schantz that all Gram negative diplococci are identical.

Bumm (1) gives the first records of Gram negative diplococci other than the gonococci. He lists the following:

(1) Micrococcus albicans amplus—larger than the gonococcus, grows on gelatine slowly.

(2) Diplococcus albicans tardissimus—resembles the gonococcus, grows on gelatine slowly.

(3) Micrococcus subflavus—grows at room temperature, does not liquefy gelatine.

Axenfeld (1) does not allow that the second of these organisms is Gram negative, saying: "The single statement of Bumm that the diplococcus tardissimus is Gram negative cannot be allowed."

Marthen (1), working in Haab's clinic, three times found Gram negative cocci which were probably micrococcus catarrhalis.

Krugenberg (1), Kayser (1), Brons (1), Axenfeld (1), and others have all reported the finding of Gram negative diplococci on the conjunctiva which from their cultures could not be considered gonococci.

The Abelsdorf-Neumann diplococcus was found by these men in the secretion of three cases of postoperative conjunctivitis after cataract. They identified it with the diplococcus albicans tardissimus of Bumm, but since this organism is not considered Gram negative by subsequent investigators, it is dignified by prefixing their names to it. It differs from the typical catarrhalis in that it forms milk-white colonies on agar and slowly liquefies gelatine.

Von Lingelsheim has described a number of Gram negative cocci under the names diplococcus pharyngis cinerus, flavus, and siccus as occurring in the throat.

All of these organisms are to be considered as included within the limits of variability of the micrococcus catarrhalis of Pfeifer.

The old idea that microörganisms are immutable entities is no longer extant. They need no longer conform to a classical type with definite limitations and characteristics to which they adhere under all conditions and environments.

On the contrary it is recognized that an organism varies with a varying environment, and further, that certain individual organisms bear so close a resemblance to one another in usual habitat, morphology, staining reaction, and cultural characteristics that it is both convenient and necessary to gather them into groups, and we attempt to assign to the groups, group characteristics.

It would be no more just to deny to an organism membership in one of these groups because it showed some minor variability than it would to deny to an individual membership in his social group because he happened to be red-headed.

Moreover by artificial means it is possible so to change the members within a group that they will assume the characteristics of other members of the same group or of allied groups.

It would be a mistake to conclude from what has been said that this grouping of the organisms is either cumbersome or confusing. The very opposite is true. The groups are natural divisions, they follow natural lines of cleavage, and the variations within the groups afford a rational explanation for many of the pathological variations so frequently noted and so frequently confusing.

The Gram negative diplococci found on the conjunctiva fall into three such groups—the micrococcus catarrhalis, the micrococcus intracellularis, and the gonococcus.

Brons, who has studied these organisms extensively, concludes that they are members of the same family.

This family relationship is emphasized by the agglutination phenomenon which they exhibit. In response to the general principle that a concentrated solution of a serum of a definite bacterium is able to agglutinate bacteria which are allied to it, these three Gram negative diplococci interact. That is to say a concentrated serum of any one of these organisms will agglutinate all three members of the family. It is only when such a serum is used in high dilution that it becomes of value for the purpose of differentiation.

Of these organisms the micrococcus catarrhalis is the most vigorous and resistant. It is found commonly on the mucous membrane of the nose and throat, from which circumstance it derives its name. The conclusion reached by many authors that the meningococcus also is commonly found in the nose under normal conditions is erroneous and is doubtless drawn from the fact that it resembles the catarrhalis.

The catarrhalis grows on all the common media both at incubator and room temperature. This distinguishes it from other members of the family which grow only at incubator temperature.

It has a tendency to develop large forms when in culture and tetrads commonly occur. Neutral red litmus whey becomes blue. None of the sugars are fermented.

The catarrhalis is a pathogenic organism. Injected intraperitoneally, intravenously, and subcutaneously into rabbits and guinea-pigs it produces no results. Injected intraperitoneally into mice it produces diarrhea and death.

On the conjunctiva of man it is probably capable of producing a mild, self-limited inflammation.

The meningococcus intracellularis occurs very infrequently on the conjunctiva. There are few unquestioned demonstrations of its presence there.

It does occur here, however, and that too on the conjunctiva of healthy individuals who have not been associated with those sick with meningitis.

The various reported cases falling in this class are interesting.

C. Frankel (2) reported the first purporting to be such in 1899. Frankel's meningococcus is questioned however on the ground that it decolorizes incompletely by Gram and forms chains in cultures.

Haglund's (3) case reported in 1901 showed only diplococci in the secretion, some intracellular. However on cultivation it showed at first diplococci, then long chains, and was Gram positive. It must be concluded therefore that he dealt with streptococcus.

Moisonnier (4) in 1907 reported before the Ophthalmological Society of Paris the case of a fourteen-year-old child having a pseudomembranous conjunctivitis accompanied by an albuminoid, grayish white discharge and complicated by a perforating ulcer of the cornea (two perforations) which he said was due to the meningococcus. He submitted cultural proof which was not so conclusive as to induce universal recognition of his case.

From Axenfeld's clinic, Brons (5) reported the case of an eleven-weeks-old infant with an acute blennorrhœa and keratomalacia. In the discharge were found pneumococci and Gram negative, intracellular, biscuit-shaped organisms. Cultural, agglutination, and sugar fermenting tests showed it to be a true meningococcus. The pneumococci disappeared from the secretion the first day, the meningococci were found for two weeks.

MacKee (6) (1908) reports the isolation of the meningococcus from the normal conjunctival sac in a boy who came to his clinic for glasses.

Lutz (7) (1910), from a case of catarrhal conjunctivitis.

Verderame (8) (1912), working in Axenfeld's clinic at Freiburg, from a shoemaker forty years old who came to the clinic for glasses.

Of more frequent occurrence are the cases suffering from meningitis having at the same time a conjunctivitis the discharge from which shows meningococci. Koplick (9), Smith (10), Gabrielides (11), Robinson (12), Councilman (13), Davis (14), MacKee (15), Ishii (16), and Anargyros (17) all report from one to many of such cases. In fact a conjunctivitis complicating a meningitis is a frequent clinical observation.

But it would be a mistake to conclude from such a clinical observation that we are dealing with a conjunctivitis due to the meningococcus, for both Brons and MacKee have reported cases suffering from meningitis having at the same time a conjunctivitis the discharge from which showed Gram negative diplococci which were not meningococci.

On the other hand, the fact that no organisms are found in the discharge from a conjunctivitis in a meningitic patient is no proof that we are not dealing with a meningococcic infection, for the occurrence of a metastatic meningococcic conjunctivitis is among the possibilities.

This list of reported cases, which is fairly complete, shows how infrequently the meningococcus is found on the conjunctiva. This fact has a very important clinical bearing.

The differentiating of the meningococcus from the gonococcus at times presents great difficulties.

The usual points of differentiation, viz., that the meningococcus grows freely on serum media, grows on glycerine agar, and produces acid in glucose, while the gonococcus grows only on serum media and here produces but a scanty growth, is sufficiently accurate for clinical purposes. The ultimate differentiation required by research is not to be stated in such simple terms and depends upon the variability which the different strains present, the limits to which are still under discussion.

The point of distinction depending on the difference in the vigor of the growths on the different media is not so certain as was once thought, for while it is generally true that the meningococcus grows most strongly on blood serum and glycerine agar, this vigorous growth may occur with some strains of the gonococcus.

The prevailing opinion that the gonococcus does not grow at all on simple media is erroneous and is an uncertain means of differentiation. It is possible by continued culture to adapt many strains to grow on ordinary media.

But—and here is the important clinical observation—original cultures do not grow on ordinary media unless pus or body fluid has been freely transferred with the culture.

In the agglutination test we have a valuable but questionable method of deciding between the gonococcus and the meningococcus.

A meningococcal serum of high value, properly diluted, will agglutinate the meningococcus only, not the gonococcus.

This principle holds with the catarrhalis also, *i.e.*, a powerful meningococcal serum properly diluted will agglutinate the meningococcus but not the catarrhalis, and conversely a powerful catarrhalis serum will agglutinate the catarrhalis but not the meningococcus. In this latter case however the test is seldom if ever necessary for diagnostic purposes.

A final simple test for deciding between the gonococcus and meningococcus, but unfortunately one which we are prohibited from employing, is that of inoculating the human urethra. Here the gonococcus always produces a typical reaction, the meningococcus produces no result. We must conclude from this that, however closely they resemble each other in staining, morphologic, and cultural characteristics, they are essentially different in their physiology.

In conclusion let me emphasize the clinical bearing of this brief review.

Given a case of blennorrhea the secretion from which contains Gram negative diplococci, what is the first important step? Obviously it is to exclude the gonococcus, for the presence of this organism would influence directly our prognosis and our treatment.

Is the slide diagnosis of any value for this purpose? Yes. It is true it has lost some of its certainty, but this is only relative, and the more laborious laboratory methods should not displace this simpler one any more than the laboratory methods in other departments of medicine should displace the careful clinical examination in which the older members of our profession so greatly excel.

The laboratory should supplement those methods of examination which time and experience have proven valuable and not displace them.

To what degree has the slide examination lost in certainty? In direct proportion to the certainty with which the other members of the Gram negative group are present on the conjunctiva and cause pathological changes there.

The proposition is decidedly different in the case of the urethra. Here Gram negative diplococci other than the gonococcus are not found. The presence of Gram negative diplococci in a blennorrheal urethral discharge may be accepted as certain clinical evidence of the presence of the gonococcus.

Not so in the eye. Here all the Gram negative diplococci occur.

The space already consumed by this paper prohibits entering into a discussion of the frequency with which the various members of this family are met with on the conjunctiva, or whether or not they are capable of producing a blennorrhea, and if so, of the clinical pictures which the various members of the family present.

I will therefore close by stating a few clinical conclusions.

A purulent conjunctivitis the smears from which show Gram negative diplococci, morphologically and clinically resembling the gonococcus, should be treated as a gonorrheal ophthalmia. In the presence of a urethral discharge or definite history of infection a definite diagnosis of gonorrheal ophthalmia should be made.

A purulent conjunctivitis, in a person nursing a case of epidemic meningitis or giving a history of possible recent exposure to infection by the meningococcus, the smears from which show Gram negative diplococci, should be treated as a gonorrheal ophthalmia, but the diagnosis withheld until substantiated by cultures.

A mild conjunctivitis, the smears from which show Gram negative diplococci, should be treated as conjunctivitis in general is treated; cultural and laboratory procedures should be at once initiated to establish a definite diagnosis.

The diagnosis of mild gonorrheal infection should not be made without exhaustive cultural and laboratory diagnosis.

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A PRIMARY TUMOR OF THE OPTIC NERVE SUCCESSFULLY REMOVED, WITH PRESERVATION OF THE EYEBALL, BY THE KROENLEIN METHOD.[1]

By Dr. ARNOLD KNAPP, New York

(*With six illustrations on Text-Plates XVIII. and XIX.*)

M. J., aged 9, was brought to the hospital in December, 1914, because of a prominence of the right eye which had been noted for one year and which was slowly increasing. On examination, the right eye is pushed straightforward in the axis of the orbit (Photograph No 1), the motility of the eyeball is normal, palpation reveals no tumor in the orbit, sight is reduced to perception of light in the extreme temporal field. Ophthalmoscopically the disk shows a neuritic atrophy. Examination of the nose is negative. The diagnosis of tumor of the optic nerve is made and an operation advised.

Operation.—December 31, 1914. Under ether the usual incision in the Kroenlein operation along the outer margin of the orbit is made. The bone flap is formed with osteotome and mallet and reflected. A horizontal incision is made in the orbital periosteum and the small finger is carefully introduced. This encounters an elongated swelling continuous with the optic nerve, which extends from the eyeball to the apex of the orbit. The surface of the swelling is smooth and soft. Between the tumor and the eyeball there is a small portion of apparently normal optic nerve. Deep retractors are introduced and the mass is exposed. It is found to be bluish in color. With the finger the tumor is isolated from the surrounding tissues and the optic nerve divided directly behind the eyeball. This part of the tumor is then grasped with a forceps and the rest of the mass freed and cut through as near the apex of the orbit as possible. During this manipulation a good deal of soft jelly-like tissue is expelled through the cut end of the tumor.

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[1] Presented at meeting of Am. Ophth. Soc., July, 1915.

ILLUSTRATING DR. KNAPP'S CASE OF "A PRIMARY TUMOR OF THE OPTIC NERVE"

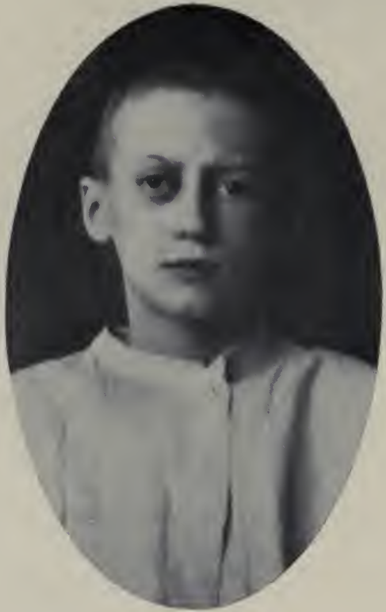


FIG. 1.—Before operation.

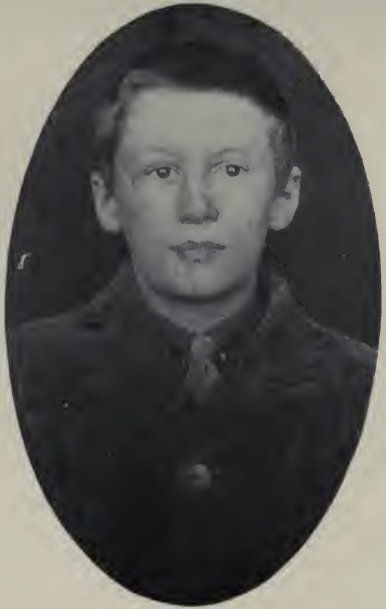


FIG. 2.—After operation.

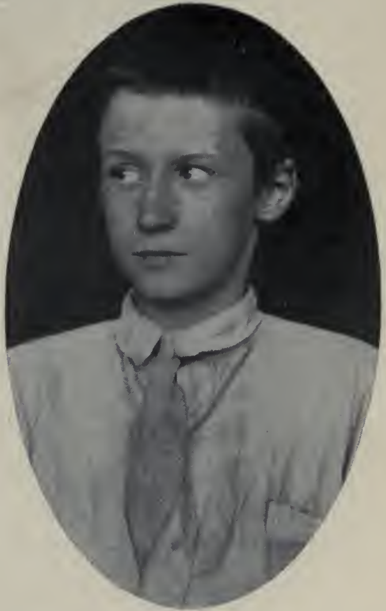


FIG. 3.—Showing the extent of lateral motility after operation.

There was some hemorrhage. The flap is replaced, deep catgut sutures are introduced, and the skin incision is united with silk. At the close of the operation slight exophthalmus was still present. As this was believed to be due to hemorrhage, the eyelids were sutured together.

During the next twenty-four hours the patient vomited a number of times. The upper lid shows some blood staining. A wet dressing is applied.

January 4th: The swelling has not increased, the skin of the lid is soft, there is no fever, and the patient feels well.

January 5th: The temperature rose to 102° F. The boy complains of some headache. The region about the incision is somewhat swollen. The sutures are removed and the subcutaneous tissue opened into. This was followed by the escape of considerable blood and pus.

January 15th: The infection which seemed to have been localized to the subcutaneous tissue rapidly subsided and the patient is now able to open his eye. The cornea is anæsthetic; the motility of the eye is good, except to the outer side; the pupil is moderately dilated; the optic nerve is white. Retinal vessels as they emerge from the disk are absolutely normal in size. There is no pulsation on pressure of the eyeball. In the region of the macula or perhaps a little beyond the macula there is a whitish area which does not look like œdema but rather more like a deeply situated retinal exudate.

January 25th: The wound is closed; there is still slight swelling of the eyelids; the position of the eye is good; some of the vessels of the retina are distinctly contracted; the whitish area in the macula has disappeared, leaving a few spots. The fundus is otherwise normal.

February 20th: The motility outwards has improved, the pupil is dilated, the vessels are smaller to-day than they have previously been. The optic nerve shows a further stage of neuritic atrophy and the whitish changes in the macula look like connective-tissue changes with some pigmentary deposits in the underlying choroid.

March 10th: The pupil is dilated; motility outwards is better; the inferior blood-vessels are well filled.

June 22d: The position of the eye is normal (Photograph No. 2). There is no swelling of the lids; except for a dilated pupil, the eye looks perfectly normal; motility outwards is completely restored (Photograph No. 3). The retinal vessels are partly normal in size, while some are extremely narrow to the point of obliteration, where they are transformed to white lines. The region of the macula is occupied by an area composed of pigment and atrophy. On the nasal side of the disk there are some areas of slight choroidal atrophy and some connective-tissue changes in the retina. The optic nerve is completely white. The scar of the incision is a linear one and not noticeable.

The excised part of the optic nerve and tumor consists of an irregular cylindrical-shaped mass 3*cm* long by 2*cm* wide at its broadest part. The mass is entirely surrounded by a connective-tissue capsule which is the extended dural sheath. Within this sheath at the cut extremities of the tumor a smooth bluish tissue can be seen which is the capsule of the tumor proper. This is presumably the pia. Within this pial sheath there is a swollen, œdematous, bluish-red-looking tissue, with a central defect which at the part of the tumor nearest the apex of the orbit occupies nearly the entire tumor. The tumor is hardened in formol and in Müller's fluid. Paraffin and celloidin sections are made.

Microscopic Appearances.—In the sections of the tumor stained with hematoxylin-eosin, nearest to the eyeball the general structure still resembles the optic nerve. The interseptal spaces are distended, the septa are irregularly hypertrophied, and there is a large increase of the glial elements. This proliferation of the glial tissue is particularly marked along the margin of the spaces where it is continuous with tissue in the sheath (Photograph No. 4). The cells have round or oval nuclei with irregular and indefinite protoplasmic bodies situated in a branching network of fibrillæ. The Weigert stained specimens show irregular and degenerated nerve fibres. Toward the center of the nerve the interseptal spaces become empty and only the connective-tissue trabeculæ with their vessels are present in between a blue-stained amorphous tissue. The blood-vessels are dilated but do not show any change in their walls. The dura is normal. The pia is irregularly thickened, by an infiltration of tissue whose cells vary in different parts. In one place where the central vessels enter the optic nerve, the glia cells are directly continuous with the cells in the pia, where they are crowded together. In other parts the pia is greatly thickened by these invading cells, which are often separated by large clefts in the tissue filled with a blue material.

Proceeding backward from the eyeball, the changes within the neural portion of the optic nerve become more marked and the configuration of the optic nerve is entirely lost. Within the widely distended pial and dural sheaths there is a large cavity which before operation contained the jelly-like material expressed during the operation. The margin of this artificial cavity is formed by proliferating tissue springing from the pia, which is curiously lobulated (see Photograph No. 5). Under the high power this tissue

ILLUSTRATING DR. KNAPP'S CASE OF "A PRIMARY TUMOR OF THE OPTIC NERVE."

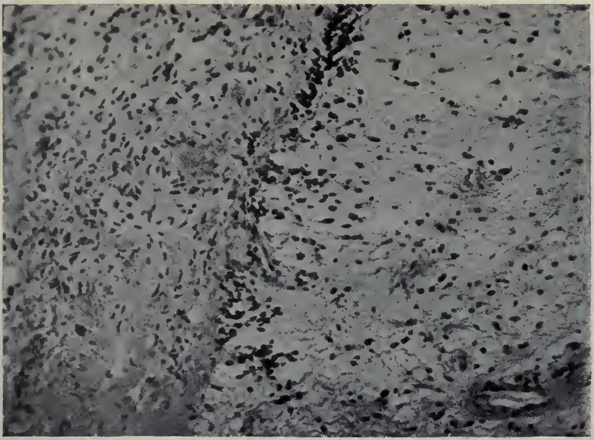


FIG. 4.—Section from tumor near eyeball, showing neuroglia proliferation directly continuous with the infiltration of the pia and of the sheath.

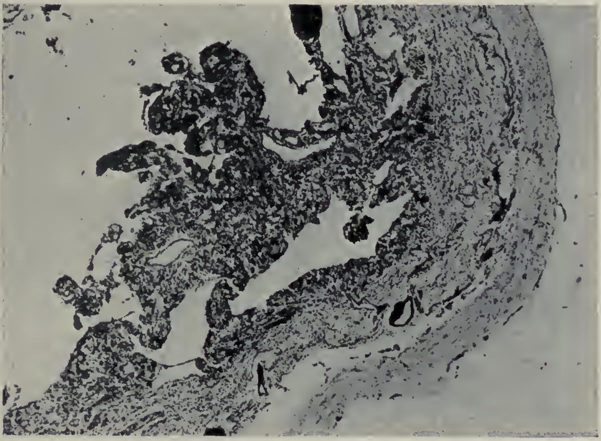


FIG. 5.—Section from tumor near apex of the orbit, showing the lobular condition of the tumor springing from the internal surface of the pia, the central cavity formerly containing a myxomatous-like tissue.

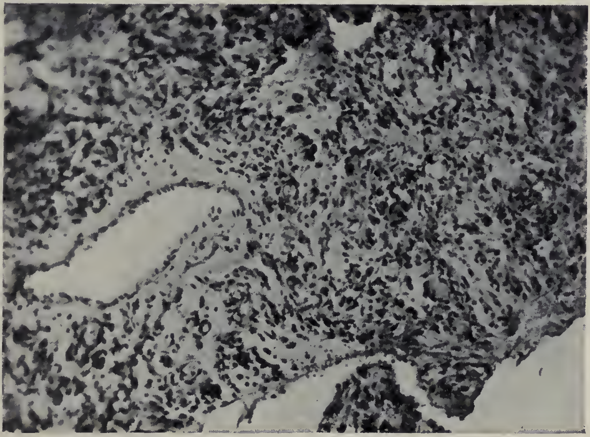


FIG. 6.—High power of this portion of the tumor.

is very cellular, the nuclei are round or oval, the cell bodies can not be identified except for an occasional fusiform or branching tendency; they are separated by vacuoles and cystic spaces and replaced by a substance which stains blue. The great vascularity of this tissue is very striking and suggests a hemangioma; the vessel-walls show no degenerative changes.

Under "Tumors Arising in Tissues Derived from the Mesoblast," Collins and Mayou (in *Pathology and Bacteriology of the Eye*) describe the new growths of the optic nerve as follows. These are most frequently neurofibromata. In some tumors there is an overgrowth of all of the connective-tissue constituents, a general fibromatosis. In others, some parts are exclusively affected. Thus the growth may be entirely in the nerve itself starting from the neuroglia and fibrous trabeculæ without involving the sheaths. Not uncommonly the pial sheath and the fibrous tissue are affected and the dura escapes. The new growth is composed of fibrous tissue, either fully formed or of an embryonic type. Cystic spaces containing fluid may form within the growth. The fluid has not been found to contain mucin, and there does not appear to be any real evidence of myxomatous degeneration.

Parsons (*Pathology of the Eye*) regards these tumors as belonging to the endotheliomas, and believes that the neuroglial proliferation is a subsidiary phenomenon.

A. C. Hudson (*Ophthalmic Hospital Reports*, vol. 18, 1910) gives an exhaustive review of 118 primary tumors of the optic nerve from their clinical and pathological sides. He agrees with Fischer in designating those tumors as examples of gliomatous degeneration and suggests the following modification, "degenerative gliomatosis implying a generalized overgrowth of neuroglial tissue of infiltrative character dependent upon some degenerative change in the tissues of unknown origin."

Our tumor shows a general neuroglial proliferation with myxomatous-like degeneration, though the main seat of the process seems to be in the pia. A transition of the two parts of the tumor can be made out. The specific neuroglia stain unfortunately did not succeed, owing to improper fixation of the specimen.

The clinical features of this case do not differ from those generally found in this well-defined group of tumors.

The operative procedure, the Kroenlein osteoplastic resection of the outer bony wall of the orbit, proved perfectly satisfactory as it furnished free access to the site of the tumor and permitted the preservation of a normally appearing eye without any subsequent disturbance of motility.

An interesting feature in the course after removal of these optic-nerve tumors, is the changes in the retinal circulation which occur. In our case it was very remarkable that notwithstanding complete division of the optic nerve, and its blood-vessels, the retinal circulation apparently was unaffected, the vessels being for at least three weeks of normal size, both the arteries and the veins, except that pressure exerted upon the eyeball elicited no pulsation. Subsequently some of the vessels became narrow and obliterated. The inferior temporal vessels, however, are at the present date still of perfectly normal size.

Schlodtmann, in his monograph on the "Extirpation of Retrobulbar Tumors," published in Vossius' *Sammlung Zwangloser Abhandlungen,* 1900, has given this feature particular attention, and shows that the changes in the ophthalmoscopic picture of the retinal circulation after operation depend upon whether a collateral circulation has been established or not. It is evident that a tumor obliterating the optic nerve will interfere with the central retinal vessels. Under these circumstances a collateral circulation from the posterior ciliary blood-vessels and the retina must take place and, as the latter vessels may partly or completely escape obliteration through the operation, the subsequent circulation of the retina will be carried on by these vessels. If this collateral circulation has been developed, no evidences of an arrest of the retinal circulation (ischæmia, œdema of the retina) occur. The pigmentation and atrophies which are observed in the eyeground are presumably the evidences of a disordered circulation.

A point to which I want to draw particular emphasis is the incomplete removal of these optic-nerve tumors which, according to Hudson, occurs in 50 %. Thus, in the case just described, the tumor process was not limited to the apex of the orbit, and unquestionably has extended into the cranial portion of the optic nerve. At present there are no signs, however, of any intracranial extension. In the cases on record not a single instance of local recurrence in the orbit has been noted.

These tumors are generally regarded as almost benign. It seems to me that Byers is correct in warning against this assumption, even if it is years before the intracranial extension shows itself. As the X-ray seems to possess a distinct effect on the growth of gliomatous tissue (see Axenfeld, *Klin. Monats. f. Augenhlk.*, 1915, No. 1), should not systematic treatment with the X-ray constitute a part of the treatment of these cases?

A CASE OF CYCLICAL THIRD-NERVE PARALYSIS.

By Dr. G. GROETHUYSEN, University Eye Clinic, Munich.

Translated from the *Arch. f. Augenhlk.*, Vol. LXXVI., No. 3–4, 1914.

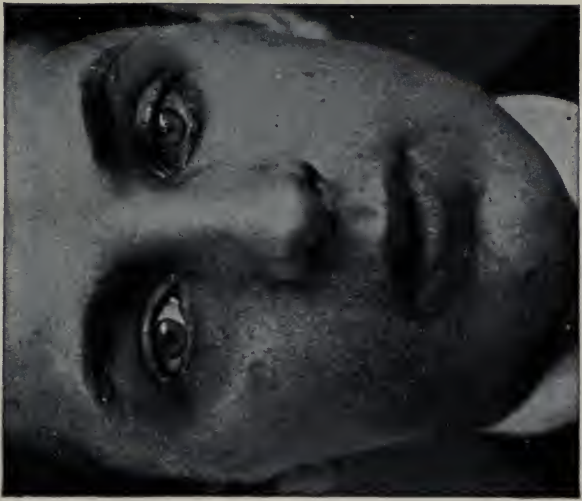
(*With two half-tone illustrations in the text.*)

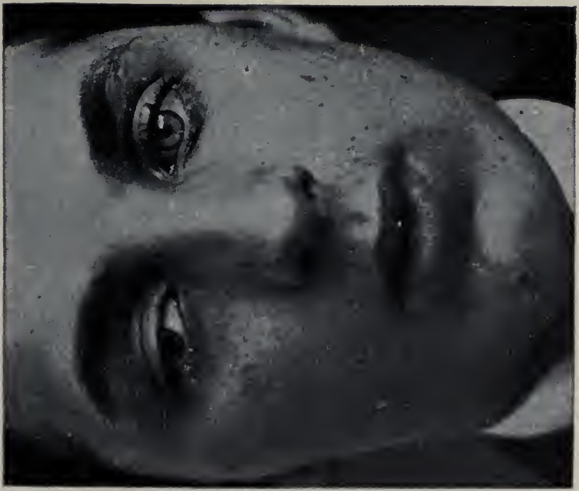
THIS case is interesting on account of the way in which the various phases of the oculomotor-nerve paralysis could be influenced.

F. X. P., aged 18, a baker, came to the clinic in order to have an operation performed on his right eye which at times he was not able to open. This condition has existed since birth. The previous history and his family history are negative. The patient is well nourished and mentally normal. The nervous system, beyond the oculomotor-nerve paralysis, shows no abnormalities. Reflexes are normal. Romberg is negative.

The periodic variations in the right eye are as follows:

In the condition of paralysis the palpebral fissure is 5*mm* wide. The eyeball is slightly abducted and is somewhat turned down. Pupil is 8*mm* wide and immobile; there is no reaction on sensory stimuli. The refraction of the eye shows H. as of 3½ D., 30° nasal. Eye-ground normal. S = 0.1, improved with glasses to 0.2. After about 15 seconds of this paralytic state, the eyelid shows three or four spasmodic contractions, then it is slowly raised so that the palpebral opening is as large as on the healthy side. The eyeball at the same time is adducted and rotated through the action of the superior oblique. The pupil contracts to 4*mm*. This transition to the state of spasm lasts from about four to five seconds. During this spasmodic state with the eyes directed straight forward no change can be observed except for a narrow pupil on the diseased side. The pupil is then absolutely immobile. Skiascopically the refraction has changed to a myopic astigmatism. The axis is now 15° nasally; vision reduced to counting fingers in 2¾*m*. With glasses it is improved to 0.2. This condition lasts twenty seconds. Then a number of small contractions are observed in the upper lid; the lid falls; the pupil becomes wide, and





after seven to eight seconds the condition of paralysis is again present.

The eye can be abducted to its normal extent; the adduction is only a little beyond the middle line. On looking up, the eyeball rotates in the sense of the superior oblique.

Eserin contracts the pupil to 1.8 or 2.5*mm* without arresting the above-mentioned variations. At the beginning with each contraction the patient experiences pain in the upper part of his eyeball, which continues for one half hour. Atropin dilates the pupil to a maximum of 9*mm*. Increased frequency of pulse (150) does not influence the duration of these attacks. During sleep the duration of this paralytic condition lengthens three times on the average, namely, from fifty-five to sixty seconds.

The transition to the spasmodic condition takes place with a number of contractions. The palpebral fissure is permanently opened and measures between 2 and 6*mm*. The cornea always remains visible. The left eye shows no changes beyond a slight myopic astigmatism. The pupil reacts directly and consensually. The individual phases can be influenced as follows:

The state of spasm can be lengthened on asking the patient to close his healthy eye and at the same time making him fix with his affected eye an object held at a distance of 15*cm*. This repeatedly produced periods of spasms of fifty seconds in duration. The consecutive state of paralysis could not be lengthened. At the same time, this state could be interrupted at will every four seconds, and transformed into a spasm, if the patient was forced to intently fix an object near the affected eye. The transition took place without spasms slowly and uniformly. On removing the object which the eye was fixing, the state of paralysis recurred and remained for the usual length of time. Both symptoms appeared to a less extent when the patient was asked to turn his eye as far as possible to the left, which produced the greatest degree of adduction in the affected eye. A moderate lengthening of the paralytic condition was obtained on a maximal turning of the eye to the right, during which an interruption of the spasmodic condition was not observed. The period in which the phenomenon was prolonged by forcibly turning the eye to the right or to the left was from five to ten seconds.

This case differs from those previously described by the marked ways in which the various phases could be influenced. This tendency suggests that the cause of cyclic oculomotor-nerve paralysis is a cortical process.

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HESSE. "Über Verengerung der Pupille bein Nahsehen." *Klin. Monatsbl. f. Augenheilk.*, i., S. 740.

1913. KRAMER. "Zyklische angeborene Okulomotoriuserkrankung." (2 Falle.) *Zeitsch. f. Augenheilk.*, Bd. 29, S. 77.

MEISSNER. *Zeitschr. f. Augenheilk.*, Bd. 29, S. 78.

LAUBER. "Ein Fall von zyklischer Okulomotoriuslähmung." *Wiener klin. Wochenschr.*, No. 18, S. 707.

UHTHOFF. "Über einen Fall von periodischen und kontinuierlichen Schwankungen im Durchmesser der Pupille bein angeborener oder wenigstens frühzeitig erworbener linksseitiger Okulomotoriuslähmung bei einem neunjährigen sonst gesenden Mädchen." *Klin. Monatsbl. f. Augenheilk.*, li., S. 344.

REPORT OF THE TRANSACTIONS OF THE SECTION ON OPHTHALMOLOGY OF THE ROYAL SOCIETY OF MEDICINE.

By Mr. C. DEVEREUX MARSHALL, F.R.C.S., London.

An ordinary meeting of the Section was held on Wednesday, June 9th, under the presidency of Mr. Priestley Smith, F.R.C.S., of Birmingham.

Mr. A. C. Hudson showed a case of **sympathetic ophthalmitis treated by salvarsan and neo-salvarsan.** It was regarded as an undoubted case of the condition, and seemed a genuine cure.

Mr. J. S. Hosford exhibited two cases of the **albuminuric retinitis of pregnancy**; Dr. Attlee, **coloboma of the iris in mother and child**; Mr. Charles Wray, a case of **bony growth in the frontal sinus.** In cases of retrobulbar neuritis suspected to be of sphenoidal origin, he advocated making the patient spend some time with the face downwards, with a view to facilitating drainage from the sphenoidal and posterior ethmoidal cells. Mr. W. T. Holmes Spicer discussed the case.

Mr. J. Herbert Fisher read a paper on **retinitis of pregnancy.** He had not included in the title the term "albuminuric," as he wished to lead his hearers away from the idea that the acute retinal changes were the results of the kidney disorder. Obstetricians now no longer explained the albuminuria of pregnancy as the result of obscure reflex effects of the gravid uterus upon the kidneys, or by mechanical pressure on the ureters. They attributed it, with eclampsia and pathological vomiting of pregnancy, to toxæmic products in the circulation. Eclampsia could not be predicated by any examination of the urine; the effects were especially seen in the quality of the blood and in the blood-vessel walls. In fatal cases of eclampsia, hemorrhages of brain and necrotic changes in the liver were often found, and albuminuria was an effect of the disease on the kidney, not the cause. In the retinitis of pregnancy, the condition of retina was different from that in albuminuric retinitis; as also was its sequel. Syncytio-toxins—products of the disintegration of the syncytium cells—had been found in these cases; and these cells immediately connected the fetal with the maternal structures. The author proceeded to give particulars of a series of typical cases of the condition which had been under his care. In one fatal case, Mr. A. C. Hudson made a pathological examination on the day after death, and found the coats of the eye *in situ*. There was some œdema of the nerve head, and in the nasal quadrant of the retina were two large hemorrhages. The microscope showed the sclera and nerve sheaths to be normal, the chief pathological changes being in the large choroidal arteries, many of which showed gross endarteritis, causing, in some instances, obliteration of the vessel lumen. Some of the choroidal arteries were normal. Similar pathological changes were found in sections of posterior ciliary arteries surrounding the optic nerve behind the eyeball. Bruch's membrane was everywhere intact, and the retinal pigment normal. The retina and optic nerve head showed evidence of œdema, in the former almost limited to the internuclear layer. Rods and cones were almost entirely absent, but this may be attributable to post-mortem changes. In the large retinal veins there was pronounced thickening of the adventitial coat. He had found it difficult to group his cases. The rule had been for good recovery of vision to ensue, with the disappearance of all acute manifestations in the retina, thus differing absolutely from cases of ordinary renal retinitis. In cases in which defects of vision were permanent, this seemed to have been because changes had been produced in the walls of the arteries, or an atrophic condition of the nerve. A recurrence of the retinitis was not necessarily seen when subsequent pregnancies occurred, even though the albumen did not quite disappear in all. One of his cases died, after an interval of six years, from cardiac failure; another, after eight and a half years, of cerebral hemorrhage into the left corpus striatum. In this case the kidneys were found to be of the typical red granular type. It seemed clear, from his cases, that albuminuria of pregnancy was not sufficient, alone, to set up the typical retinitis of pregnancy.

In the ensuing discussion, Mr. J. S. Hosford reported having carefully observed sixteen cases during the last fifteen years; only three of them were now alive. All but two ultimately developed a star-shaped spot on the macula, a sign which he regarded as of fatal omen. Many patients seemed to quite recover from the initial attack, but later had a relapse. In a series of 132 cases seen in Dr. Fenwick's wards, 81 were in females, 51 in males; the onset among single men and single women seemed to be about equal. Much of the renal trouble seen fairly late in life might have started, in females, in pregnancy. Only three of the 132 cases had myopic eyes. Since the Wassermann reaction was introduced, he had had all the cases he saw so tested, but none was syphilitic.

Mr. W. C. Rockliffe related a case in which **retinitis occurred in the first pregnancy,** but the defect of sight seemed to be quite recovered from after premature labor was induced. A subsequent pregnancy brought on a repetition, but though labor was again ended prematurely, sight became progressively worse, and ended in blindness. The patient died, four years later, from heart failure.

M. J. B. Lawford alluded to the far-reaching effect of the toxæmia. In some of the author's cases, although there was no recrudescence of retinal change during subsequent pregnancies, yet toxic effects showed themselves at a later date, and eventuated fatally. It was a common belief that one of the safeguards in this condition was the avoidance of further pregnancies in the patient. In one case which he had under care over twenty years ago, the lady developed retinitis in her first pregnancy, and had great defect of sight. This disappeared after delivery, and, acting on the advice of her doctor and himself, she had no further pregnancies. Her sight remained good for a number of years, but ultimately she developed advanced changes in the retinal vessels, and succumbed to chronic nephritis. Another patient, older, developed the condition in her third pregnancy, and recovered. The advice to bear no more children was disregarded, and in her next pregnancy there was a great aggravation of her toxæmic condition, and she died of nephritis. He asked whether obstetricians were aware of the reason for the persistence of the toxic effects of the first attack, even though some subsequent pregnancies did not seem to be accompanied by the symptoms. There seemed to be need for a revision of the view as to the comparative innocuousness of the retinitis of pregnancy.

Mr. LESLIE PATON regarded the paper as important as giving a broad view of a disease not apparently due to a microbial poison, but to a cyto-toxin; and he tentatively suggested that such conditions as the iridocyclitis seen in women at the period of the climacteric would possibly be brought into the same category. The seriousness of the disease seemed to be directly proportional to the extent to which the vessels were injured at the time of the attack. One case, though presenting "silver-wire" arteries, remained still well, eight years after the attack. He was much interested in the statement of the author that subsequent pregnancies need not necessarily cause a recurrence of the retinitis, for it touched a matter on which advice was frequently asked.

Mr. FISHER replied, suggesting combined investigation by obstetricians and ophthalmologists concerning the diseases attributable to the toxæmia present in pregnancy.

QUARTERLY REVIEW OF THE PROGRESS OF OPHTHALMOLOGY.

By H. Koellner, Berlin; W. Krauss, Marburg; R. Kümmell, Erlangen; W. Loehlein, Greifswald; H. Meyer, Brandenburg; W. Nicolai, Berlin; H. Pagenstecher, Strassburg; K. Wessely, Würzburg; and M. Wolfrum, Leipsic, with the Assistance of Drs. Alling, New Haven; Calderaro, Rome; Causé, Mayence; Curran, Kansas City; Danis, Brussels; Gilbert, Munich; Groenholm, Helsingfors; v. Poppen, Petrograd; Treutler, Dresden; and Visser, Amsterdam.

Edited by Matthias Lanckton Foster, M.D., F.A.C.S.,
New Rochelle, N. Y.

FIRST QUARTER, 1915.

I.—RELATIONS OF OPHTHALMIC TO GENERAL DISEASES, INCLUDING POISONS.

1. Batten. **Family cerebral degeneration with macular change.** *Quarterly Journal of Medicine*, July, 1914.

2. Hirschel, G. **The cure of obstinate trigeminal neuralgia by injection of alcohol into the Gasserian ganglion.** *Muenchener med. Wochenschrift*, 1915, p. 5.

3. Roy, Dunbar. **Acute mania following the use of atropine solution in the eyes.** *Southern Medical Journal*, December, 1914.

4. Spiller, William G. **The pathology of tabetic ocular palsy with remarks on the relation of syphilis to the so-called parasyphilitic diseases.** *Journal of Nervous and Mental Disease*, January, 1915.

5. Stephenson. **The ocular manifestations of infantile scurvy.** *Ophthalmoscope*, March, 1915.

6. Taylor, G. H. **Color sense in relation to nervous stammer.** *Ibid.*, February, 1915.

7. Uhthoff, W. **Contribution to the visual troubles caused by methyl alcohol poisoning.** *Klin. Monatsbl. f. Augenheilkunde*, January, 1915, p. 48.

8. Westmacott. **Ocular paralysis of otitic origin.** *Lancet*, November 14, 1914.

Batten (1, **Family cerebral degeneration with macular change**) reports three children in a family of five, who were affected with a progressive disease leading to dementia, blindness, and paralysis, one of whom showed macular changes. The children developed in a normal manner until three and one half years of age; epileptic fits then occurred and they began to degenerate. All three died. In one, diffuse degenerative changes were found affecting the ganglion cells in the cerebrum, cerebellum, and spinal cord.

CURRAN.

STEPHENSON (5, **The ocular manifestations of infantile scurvy**) in giving an interesting review of the ocular manifestations of scorbutus reports a case showing ocular signs which preceded the other manifestations of scorbutus. Rapid improvement took place under antiscorbutic treatment.

CURRAN.

SPILLER (4, **The pathology of tabetic ocular palsy with remarks on the relation of syphilis to the so-called parasyphilitic diseases**) says that a difference of opinion exists as to the nuclear or nerve origin of tabetic ocular palsies and a distinction is made by some in the pathology of the ocular palsies of tabes and brain syphilis. It would seem from the study of the following case of complete bilateral tabetic ophthalmoplegia that this distinction is unreliable and that in this as well as in other respects the sharp limitation formerly made of parasyphilis and cerebrospinal syphilis needs much modification.

The patient, J. F., contracted syphilis in 1895. In 1911, double ptosis developed together with general symptoms of tabes. In 1913, admitted to hospital. The examination of the eye showed a total internal and external ophthalmoplegia of both eyes with paralytic divergence. The iridic reaction was lost and the optic nerves were partially degenerated. The patient died two weeks later.

At the autopsy much lymphocytic infiltration was found in the pia of the spinal cord and base of the brain and the basilar artery presented much endarteritis. The posterior lumbar roots and the posterior columns of the cord were degenerated in the usual manner of tabes.

The ocular nerves were cut separately from the brain. Each oculomotor nerve showed much lymphocytic infiltration and this infiltration was more intense in the left nerve. These nerves were much and equally degenerated, and the degeneration was greater than that of the abducens and trochlear nerves. The oculomotor nuclei were greatly atrophied and contained few nerve cells, and the oculomotor fibers within the cerebral peduncles were much fewer than normal. Patches of rarefied tissue containing few nerve fibers were found within the oculomotor nuclei. The Edinger-Westphal nuclei were much better preserved than the other portions of the oculomotor nuclei.

The trochlear nerves showed slight lymphocytic infiltration.

The left abducens nucleus was considerably more atrophied than the right, although the right nucleus was much affected. The abducens nerves were much atrophied, the left more so than the right. Both these nerves presented considerable lymphocytic infiltration, and the left more than the right.

The degeneration of the oculomotor nerves was so far advanced that it was impossible to decide whether the degeneration began in the nerve or in the nucleus, but the findings in the abducens nerves were of importance in this respect. The left nucleus and nerve were considerably more degenerated than the right, and the lymphocytic infiltration of the left nerve at its exit from the upper medulla oblongata was greater than that of the right. This would seem to indicate that the syphilitic process was primarily in the nerve rather than the nucleus, and would make a distinction between the ocular palsies of tabes and syphilis unreliable. This case clinically was distinctly one of tabes, and the pathological findings in the cord were those of tabes. GROUT.

ROY (3, **Acute mania following the use of atropine solution in the eyes**) reports that in 10,000 refractive cases in his practice, twenty of these showed marked symptoms of atropine intoxication when this drug was used for refractive purposes. One case of iridochoroiditis, which was in the hospital for treatment, developed mental hallucinations which subsided only on the discontinuance of the drops and sedative treatment. Recovery was normal and the neurological examination showed no cause for the mental disturbance.

GROUT.

HIRSCHEL (2, **Cure of obstinate trigeminal neuralgia by injections of alcohol into the Gasserian ganglion**) has had brilliant results in several cases of neuralgia that had existed for a number of years and had resisted both internal and operative treatment. He injects first a few drops of a 2% solution of novocain and then from ½ to 1 *ccm* of 70% alcohol. Anæsthesia or hypæsthesia comes on at once, the corneal reflex is lost or greatly reduced, but usually returns after a number of hours; he has never observed a permanent loss. No recurrences have occurred as yet in the patients, after a lapse of at most a year and a half.

No other poison is so elective in its effects upon the optic nerve and retina as methyl alcohol. The changes found are in the ganglion cell layer of the retina. UHTHOFF (7, **Visual troubles caused by methyl alcohol**) found that of 200 men who drank methyl alcohol 50 showed signs of serious intoxication. Twelve died before any observations were made concerning their vision. Of the remaining 38, serious impairment or blindness occurred in two, less impairment with small relative central scotomata in six, and subjective troubles with normal ophthalmoscopic condition in nearly all the rest. Pain on moving the eye occurred once. No paralyses of ocular muscles were observed. The course in the two worst cases was typical.

TAYLOR (6, **Color sense in relation to nervous stammer**) says that out of sixty thousand cases examined for railway service, eighteen per cent. had nervous stammer sufficient to impair their usefulness as railway servants; and in none of these cases was there any red-green blindness. In one case, however, the candidate who had a nervous stammer named pale green "white." He considers it probable that a nervous stammer is much rarer in color-blind than in color-normal persons.

CURRAN.

WESTMACOTT (8, **Ocular paralysis of otitic origin**) in an excellent paper on this subject says that otogenic paralysis of the oculomotor and other orbital nerves is clearly established, but he thinks it is difficult to establish the pathological lesion present. If paralysis occurs with ipso-lateral otorrhœa, with headache and vomiting, the auditory apparatus should be explored, and also the nasal sinuses.

CURRAN.

II.—GENERAL AND EXPERIMENTAL PATHOLOGY AND TREATMENT.

9. BADER. **The subconjunctival injections of inorganic salts and the dissociation theory.** *Zeitschrift f. Augenheilkunde*, March–April, p. 155.

10. ELLIOT. **A tumor of the eye presenting unusual features.** *Ophthalmoscope*, February, 1915.

11. SZILY. **Anaphylaxis in inflammations of the eye.** *Klin. Monatsbl. f. Augenheilkunde*, January, 1915, p. 1.

12. WEIDLER, W. B. **Intraocular sarcoma. With report of a case of spontaneous rupture of the globe.** *Annals of Ophthalmology*, January, 1915.

Spontaneous rupture in sarcoma is of rare occurrence and probably generally due not to increase in the size of the tumor but to sudden rupture of an intraocular blood-vessel as in the case reported by WEIDLER (12, **Intraocular sarcoma**). The usual point of rupture is the cornea.

ALLING.

ELLIOT (10, **A tumor of the eye presenting unusual features**) describes an unusual tumor which apparently began in the eyeball over nine years previously. When removed, it was egg-shaped and measured 119*mm* from before backward. It resembled a large multilobular cyst with contents of varying consistence. The walls consisted of hypertrophied sclerotic and cornea. The deeper structure was fibrillar, forming a sponge work, the meshes of which contained a homogeneous substance. The fibrils were branching processes of large multipolar cells which strongly suggested nerve tissue or altered neuroglia.

CURRAN.

SZILY (11, **Anaphylaxis in inflammations of the eye**) considers that the local anaphylactic inflammations of the eye possess a great theoretical and practical interest for human pathology. In the course of various diseases of the eye conditions are frequently present that favor the origin of an inflammatory anaphylactic poison. Such sources are: (1) The component of the anaphylatoxin from the specific microorganism which excites inflammation; (2) the anaphylactic poison generated by the action of the body juice upon homogeneous tissues. With the great multiplicity of possibilities for the generation of inflammatory anaphylatoxins, especially as there is no specificity in their action, it is for the present impossible to pretend that anaphylactic processes are the primary causes of certain typical eye diseases. The preliminary theory of a primarily acting poison for the generation of anaphylaxis is unavoidable under any circumstances. The theory of non-specific transmission of irritation, whereby a specific or non-specific sensitivation of one eye causes in the other a condition of increased sensitiveness, lacks an exact experimental foundation. The importance of anaphylaxis in ophthalmology lies in the fact that we have learned to recognize in it a new possibility for the explanation of inflammatory processes in the eye where the immediate action of localized germs or of their toxins could not furnish one.

BADER (9, **Subconjunctival injections of inorganic salts**) finds the explanation of the effects of subconjunctival injections of inorganic salt solutions in the theory of electrolytic dissociation, which depends on the diffusion and osmosis induced by the salt, and the kations and anions induced by the ions. Subconjunctival injections of neutral potassium salts, such as 0.5 to 1 *ccm* of a 2.55% KCl, a 3.95% KNO_3, and a 5.21% K_2SO_4 solution, cause no harm to a rabbit's eye. On the contrary, isotonic neutral sodium solutions cause distinct symptoms of irritation in the eye, slight blepharospasm, injection of the globe, and a hyperæmia of the iris that causes a contraction of the pupil which lasts from fifteen to thirty minutes. These symptoms usually pass away within twenty-four hours. Daily injections of these doses cause no signs of poisoning in rabbits. Subconjunctival injections of potassium accelerate, like those of common salt, the absorption of india ink from the anterior chamber in rabbits' eyes, but more rapidly at first. The mentioned doses of the neutral potassium salts cause a considerable increase of the albumin in the aqueous, from ten to fourteen times greater than is produced by corresponding isotonic solutions of sodium. In subconjunctival injections of hypertonic neutral solutions of sodium salts the action of the salt predominates, while in those of neutral potassium salt solutions the effect of the ions prevails. With the sodium salts an irritant effect of the anions comes into play, least with the hydrochlorates, most with the sulphates. The chief action of the potassium salts is due to its kation, the potassium. The effects of corresponding sodium and potassium solutions upon freshly dead eyes of pigs and rabbits showed differences in strength that were the same, only less marked than those found in the eyes of living rabbits.

III.—METHODS OF RESEARCH, REMEDIES, INSTRUMENTS, GENERAL OPERATIVE TECHNIQUE.

13. GREEN, A. S. **A new eye speculum.** *Ophthalmic Record*, February, 1915.

14. HOLTH. **Open spectacles or closed goggles as a protection against snow-blindness.** *Ophthalmoscope*, February, 1915.

15. REITSCH. **A pocket skiascope that may be used at the same time for subjective testing for glasses.** *Zeitschr. f. Augenheilkunde*, January, p. 34.

16. SPELEERS. **Emplacement of balls of paraffine after enucleation and evisceration of the eye.** *Nederl. Tijdschr. voor Geneesk*, 1914, ii., No. 1.

17. STIEREN, EDW. **Salvarsan in ophthalmology.** *Ophthal. Record*, January, 1915.

18. TAYLOR, G. H. **Results of examination of 500 consecutive cases with Stilling's plates.** *Ophthalmology*, January, 1915.

There is still some doubt regarding the effect of salvarsan on the optic and motor nerves. STIEREN (17, **Salvarsan in ophthalmology**) has observed a number of cases of optic neuritis which seemed to improve more rapidly under this treatment than in the past with mercury but with more secondary atrophy. He believes that it promotes primary atrophy if it has already begun. He thinks that the Swift-Ellis technique is more likely to be harmless.

ALLING.

GREEN (13, **A new eye speculum**) has devised a speculum which has the two bars holding the lid plates attached to a handle so that an assistant can control the lids and hold them away from the eyeball, hence lessening the danger arising from contraction of the orbicularis.

ALLING.

HOLTH (14, **Open spectacles or closed goggles as a protection against snow-blindness**) lays down the following rules for protection against snow-blindness in Arctic, Antarctic, and sporting expeditions:

I. All more or less hermetical arrangements of goggles for the exclusion of side lights are superfluous and serve only to moisten the glasses.

II. The best frame is the common open spectacle frame, which should be fitted with large, mussel-shaped "Euphos" glasses. CURRAN.

REITSCH (15, **A pocket skiascope**) has devised an instrument consisting of two disks, one containing convex, the other concave glasses, and two disks containing cylindrical glasses for use in astigmatism. The instrument is used at the distance of half a meter. After using the glasses for the objective determination of the refraction they may be used for the subjective fitting of glasses.

The report of TAYLOR (18, **Examination with Stilling's plates**) is interesting as showing the percentage of color defects in eyes otherwise normal.

Cases	Stilling's Plates	Holmgren Wool	Williams Lantern
466	+	+	+
17	—	—	—
9	—	+	—
3	+	—	—
5	+	+	—

Rejections by the regular tests were:

Red blind	13—2.6%
Incomplete	3—0.6%
Feeble	4—0.8%
Lantern only	14—2.8%
	34—6.8%

ALLING.

SPELEERS (16, **Paraffine balls**) speaks highly of the cosmetic effect produced by using balls of paraffine at a melting point of 60° for insertion after enucleation or evisceration of the eye. (The method is well known in this country.) VISSER.

IV.—ANATOMY, EMBRYOLOGY, MALFORMATIONS.

19. COATS. **Hernia and rupture of the early lens vesicle.** *Royal Ophthalmic Hospital Reports*, xviii., part 2.

20. THOMSON. **The heredity of microphthalmos with and without cataract.** *Klinische Monatsblaetter f. Augenheilkunde*, liv., p. 236.

COATS (19, **Hernia and rupture of the early lens vesicle**) found in a four weeks' human embryo the epithelium of the left lens vesicle evaginated backward, forming a cavity. The lens vesicle was open at the surface, the epithelium and basement membrane well formed. The central cells of the lens vesicle degenerated and fell backward and gave the appearance of Morgagnian globules. The primary optic vesicle was not yet closed. In the right eye there was a rupture of the lens vesicle but not any hernia, the vesicle being almost closed. Coats says that this supports the statement of Collins that protrusion at the posterior pole may occur apart from the swelling of lens fibers and traction by the hyaloid vessels and the mesenchyma. The case also suggests that discoid cataract, etc., may be due to disease of cells in the early embryo.

CURRAN.

THOMSON (20, **Heredity of microphthalmos**) tells us of a family in which microphthalmos and lamellar cataract were hereditary. Both anomalies were present in three members of the family, while lamellar cataract alone was present in the father and another child. The grandparents were related.

V.—NUTRITION AND INTRAOCULAR TENSION.

21. BEHR. **The parenchymatous current in the optic nerve and retina.** *Archiv f. Ophthalmologie*, lxxxix., p. 265.

22. LOEWENSTEIN and KUBIK. **Refractometric studies of the aqueous.** *Ibid.*, p. 197.

As the result of his experiments BEHR (21, **Parenchymatous current in the optic nerve and retina**) believes that there are two fairly independent systems of fluid spaces in the optic nerve and retina, the parenchymatous and the circumvascular. He deals mainly with the former. The glia fibers serve chiefly for the parenchymatous current, and where they are most abundant, as beneath the pia and septa, the current is best. The interior of the bundles of nerve fibers may be injected and here also the fluid follows the individual glia fibers. These fluid spaces extend into the layer of nerve fibers of the retina. In the orbital portion of the optic nerve they are completely shut off from the intermediate space of the sheath. The circumvascular lymph spaces of the optic nerve are generally isolated and possess at the oblique entrance of the central vessels a broad communication with the parenchymatous spaces. The movement of fluid is likewise completely separate in the bundles of fibers in the nerve. It is only within the cavity of the skull that they pass out of the nerve through the pial sheath and empty freely into the subarachnoidal space and at the angle of the chiasm directly into the recess of the third ventricle. The current is directed centrally in the optic nerve.

LOEWENSTEIN and KUBIK (22, **Refractometric studies of the aqueous**) have sought to answer the question whether the composition of the aqueous is constant by an investigation of its refractive index. They find it to be constant in normal rabbits when special precautions are observed. Prolonged instillation of cocaine and brief luxations of the eyeball exert no influence. Calomel and mechanical irritation with sand were likewise ineffective, but six hours after an insufflation of dionin there was a distinct increase of the index. Subconjunctival injections of equimolecular solutions of some salts changed the refractive index in various ways. The injection of air or of distilled water caused a moderate elevation of the refractive index. Bandaging the eye led not only to hypotony, but also to a high degree of elevation of the index. Hot compresses of from thirty to fifty-five minutes' duration and congestive hyperæmia proved very efficient, while the results obtained with diathermia were of less importance.

VI.—THE SENSE OF SIGHT.

23. BLASKOVICZ. **The visual unit.** *Klin. Monatsbl. f. Augenh.*, liii., p. 552.
24. DOYNE, R. W. **"Eye" in sport.** *Ophthalmoscope*, January, February, and March.
25. SCHROECK. **Congenital word blindness.** *Klin. Monatsbl. f. Augenh.*, liv., p. 167.
26. STRAUB, M. **New optotypes for the scientific determination of the vision.** *Nederl. Tijdschr. voor Geneesk*, 1914, ii., No. 12.

STRAUB (26, **New optotypes**) thinks that for daily practice Snellen's test-types are still to be preferred, but for scientific investigations they are insufficient. The double point is the only correct physiological test. A single eye can take into account only two dimensions in the determination of the sense of form. This fixes the direction of the object in space, and it would therefore be more correct to speak of it as the sense of direction rather than of form. For the perception of minimal differences in direction short rods suffice, which may be conceived as the blending of two points. Square points having the same surface may be placed between the rods for control. Figures may be made from these rods according to Snellen's model. VISSER.

BLASKOVICZ (23, **The visual unit**) suggests as the visual units which he denominates oxyoptrie, the point at which the angle of vision has a minimum separabile of one degree, which is about the same as counting fingers at one meter. The vision would then be expressed not in fractions, but in whole numbers or oxyoptries. Thus a vision of 0.5 would be expressed as V = 30.

Nearly all of the observations of congenital word blindness have been made by English writers, to which SCHROECK (25, **Congenital word blindness**) adds five cases, four girls and one boy, in whom the peculiar faults were more or less marked. Almost all observations have been made by ophthalmologists because faulty eyes were originally suspected. He considers that such cases are more common than has been thought, and that they are of particularly great interest to teachers.

DOYNE (24, **" Eye " in sport**) discusses and analyzes the part the eye takes in the various sports. He points out the importance of coördination of extrinsic muscles of the eye in judgment of direction and distance, etc.; and admirably discusses the psychical elements in formation of judgment of position. The trend of his argument is that the good sport depends more on the coördination of both eyes than on the possession of a "master eye."

This is a very interesting paper, showing deep thought and careful preparation, and, to be appreciated, it must be read in full as it does not lend itself well to abstraction.

CURRAN.

VII.—REFRACTION AND ACCOMMODATION.

27. HARCOURT. **Fits due to uncorrected errors of refraction.** *Liverpool Medico-Chirurgical Journal*, January, 1915.

28. ROENNE. **Transitory hypermetropia in diabetes.** *Klin. Monatsbl. f. Augenheilkunde*, liv., p. 207.

ROENNE (28, **Transitory hypermetropia in diabetes**) reports a case of this nature and presents the following explanation.

Diabetes induces successive changes in the chemical conditions in the lenticular substance that cause a latent tension of the fibers. When this tension reaches a certain point the force that gives form to the lens is overcome and a change of refraction suddenly appears. The fact that this disturbance appears only in elderly individuals seems to show that a certain consistency of the lens is best fitted for its appearance.

HARCOURT (27, **Fits due to uncorrected errors of refraction**) reports a case of a youth of nineteen years who developed epileptic fits after close study. He had as many as twenty-two a day at times. The condition was apparently cured by the correct glasses and has remained so for over two years.

CURRAN.

VIII.—THE MOTOR APPARATUS OF THE EYE.

29. DORFF. **Latent nystagmus.** *Klin. Monatsbl. f. Augenh.*, liii., p. 503.

30. EWING, A. E. **Abducens palsy following nasal trauma and nasal infection.** *American Journal of Ophthalmology*, December, 1914.

31. GERTZ. **The gliding or slow movement of the eyes.** *Zeitschrift f. Sinnesphysiologie*, xlix., p. 29.

32. HENRY, JOHN P. **Ophthalmoplegia interna caused by exposure to ultra-violet rays.** *Ophthalmoscope*, April, 1915.

33. LUETTGE. **The anatomical condition in an associated lateral paralysis.** *Aerztl. Verein Hamburg*, June 9, 1914.

34. NICCOL. **A pedigree of hereditary nystagmus.** *Ophthalmoscope*, May, 1915.

35. REBER, W. **The influence of heredity in the development of strabismus.** *Ophthalmic Record*, February, 1915.

36. WILLARD, L. M. **Two cases of exophthalmic goiter with ocular muscle complications.** *Ophthalmology*, January, 1915.

EWING (30, **Abducens palsy following nasal trauma and infection**) found a paresis of the external rectus immediately after an injection of alcohol into the spheno-palatine ganglion. There was no affection of the vision and recovery took place twelve weeks afterward. The solution probably found its way upwards and outwards through the loose tissue to the sphenoidal fissure. The sixth nerve lies in the lower part of the fissure. Two other cases of spontaneous abducens palsy are reported in both of which the sphenoidal sinus was found affected.

ALLING.

WILLARD (36, **Exophthalmic goiter with ocular muscle complications**) found paralysis of the right superior rectus and left inferior rectus, also paresis of the right external rectus, in one of his cases. The thyroid gland was operated upon and the patient recovered his health although there was still some weakness of the ocular muscles. Another patient complained of diplopia and showed paralysis of the right superior rectus and paresis of the right external rectus. After operation the exophthalmos greatly improved but the superior rectus did not regain its function. The exact site of the lesion in these cases which are not uncommon, is not known but is generally considered to be nuclear. It may be the effect of toxins produced by the perverted action of the thyroid.

ALLING.

HENRY'S (32, **Ophthalmoplegia interna caused by exposure to ultra-violet rays**) case is of a young man experimenting with ultra-violet rays immediately after which his right pupil became dilated and accommodation of that eye paralyzed. He recovered fully in a week under eserine. CURRAN.

According to the observations of GERTZ (31, **The gliding or slow movement of the eyes**) this slow movement of the eyes is not associated with fixation on an object passing by, but may be excited by the thought of, or the consciousness of, a moved object. It is the motor end-result of a certain effective state of the consciousness.

LUETTGE'S (33, **Anatomical condition in an associated lateral paralysis**) patient was a boy suffering from tuberculosis. The movements of the eyes up, down, and to the left were unrestricted, but as soon as they tried to turn to the right they were arrested at the middle line, so that the child sought to compensate for the trouble by turning his head to the right. Convergence was present, but it was impossible to induce an involuntary excursion of the eyes beyond the middle line by passive rotations of the head, sensory irritations, or anything else, so a nuclear paralysis was diagnosed. A trace of facial paresis on the right side may have been present. The boy died of diphtheria. On autopsy a solitary tubercle was found superficially in the cortex of the left occipital lobe, but outside of the visual tract. A number of sharply defined glial scars were found in the pons and midbrain, evidences of a former polioencephalitis. A focus measuring 6 by *2mm* lay at the level of the trigeminus immediately in front of the posterior longitudinal bundle, yet without touching it, but a process extended to the right nucleus of the abducens which was almost completely destroyed.

DORFF (29, **Latent nystagmus**) describes two cases of the so-called latent nystagmus of Fromaget, in which the nystagmus is excited by the uncovering of one eye. Exclusion of light is not the cause, as the same effect is produced by the interposition of convex glasses. Refractive errors and disturbances of the muscular balance are almost always present, so therapeusis consists in correction of these errors, and an improvement of the binocular vision by stereoscopic exercises with as great an avoidance as possible of monocular fixation. The nystagmus is perceived subjectively by the patient.

In a series of cases published by REBER (35, **Influence of heredity in the development of strabismus**) ten years ago, he found that in 166 there was a hereditary predisposition in 33%. He now adds 81 private cases, 6% of which were divergent strabismus. In these 68% gave evidence of hereditary tendency. ALLING.

NICCOL (34, **A pedigree of hereditary nystagmus**), after reviewing Nettleship's work on nystagmus, presents an interesting family "tree" running into six generations showing the transmission of hereditary nystagmus. He has carefully studied 14 individuals and has collected information of 138 individuals of the family. Twenty of the family are affected with nystagmus, of whom 12 are males and 8 females. Twelve parents transmitted the condition to their children. Of these 4 are affected males and 8 females, of whom 5 were unaffected. Although the condition occurs in both sexes, Niccol sees a resemblance to sex-limited diseases. This paper should be read in the original. CURRAN.

IX.—LIDS.

37. FEHR. **A contribution to the adenomata of the lids.** *Zentralbl. f. prakt. Augenheilkunde*, January, 1915, p. 1.

38. KUHNT, H. **The obviation of epiphora due to eversion or commencing ectropion of the lower lid.** *Zeitschr. f. Augenh.*, 1915, p. 187.

FEHR (37, **Adenoma of the lid**) removed from the lower lid of a woman 65 years old an uncommon tumor that had gradually grown for nine years. The tumor was brown red, 3*cm* long, *2cm* broad, and *1cm* high; its surface was rough, nodular, and moist; its consistence hard. It was attached to the margin of the lid by a long, narrow base like a polyp, without encroaching on the conjunctiva or the skin. The neighboring lymphatic glands were not swollen. Excision left no apparent defect in the lid margin. Microscopically it proved to be a typical adenoma, with cells that corresponded to those of the sebaceous and Meibomian glands. It differed from adenomata of the Meibomian glands in that it did not develop in the tarsus, but from a narrow base on the margin of the lid, so it must be taken for an adenoma of the sebaceous glands. There was no recurrence at the end of a year, although the operation was by no means radical.

In this paper, which is dealt with further in the next section, KUHNT (38, **Obviation of epiphora**) describes an operation for the obviation of a high degree of traumatic ectropion with a cicatricial coloboma of the lid adherent to the bone. An incision is made about the entire extent of the adherent cicatrix and this is excised carefully so as to free the leg of the coloboma thoroughly from the bone. Then the margin of the lid was shortened, as it had become too long from stretching, and any tendency to a gorelike notching of the margin of the lid had to be obviated by suitable incisions. A piece of fat of proper size was then taken from the thigh and transplanted so as to form a good support to the lid and conjunctiva, where it was fastened with catgut sutures. The soft parts of the lid and cheek were united by deep sutures. In cases of colobomata adherent to the bone without ectropion in the nasal third of the lid, one can occasionally leave the nasal leg in place, remove the margin of the lid with the roots of the cilia, draw over the mobilized temporal leg and suture it fast. He recommends this because the nearness of the lacrimal sac and the origin of the inferior oblique offer difficulties to an extensive dissection of the nasal portion of the lid.

X.—LACRIMAL ORGANS.

39. GIFFORD, H. **A method of destroying the lacrimal sac in chronic dacryocystitis.** *Ophthalmic Record*, January, 1915.

40. KUHNT, H. **The obviation of epiphora due to eversion or commencing ectropion of the lower lid.** *Zeitschr. f. Augenh.*, 1915, p. 187.

KUHNT (40, **Obviation of epiphora**) cuts a wedge-shaped piece from the conjunctiva and tarsus having the form of an isosceles triangle with its base at the margin of the lid. The chief fault with this procedure is that it causes a notch in the cartilage and a lump in the skin. To avoid this special instructions are given concerning the making of the incisions and the introduction of the sutures. When the shortening of the lid margin does not suffice, an operation for eversion is necessary, or an attempt to make the inner edge of the lid and the lacrimal punctum normal in position by the introduction of threads. The lower lid is everted to its maximum, the patient caused to look upward and outward, and an incision is made in the conjunctiva along the transitional fold from the inner canthus to near the middle of the lid, undermined to the lower border of the tarsus, fastened with two or three double-armed threads, and these are carried downward through the skin while the lid is lifted up strongly and tied. The original must be consulted for the details of both of these operations.

GIFFORD (39, **A method of destroying the lacrimal sac in chronic dacryocystitis**) for years has treated his cases of this disease with incision and actual cautery. He now uses liquefied trichloracetic acid. His method is as follows: The tissues are anæsthetized by infiltration with cocaine and adrenalin. The sac is incised and well exposed. After zinc ointment is applied to the surrounding skin the acid is thoroughly rubbed into every part of the interior of the sac. It is then syringed out and filled with aristol powder. He claims uniformly good results and no appreciable scar. ALLING.

XI.—ORBITS, INCLUDING EXOPHTHALMOS. ACCESSORY SINUSES.

41. HOROWITZ, P. **A case of osteoma of the frontal sinus.** *Diss.*, 1914, Leipsic.

42. IGERSHEIMER. **Inflammation of the orbit.** *Muenchener medizinische Wochenschrift*, 1915, p. 477.

43. IGERSHEIMER. **Temporal optic atrophy in ethmoiditis.** *Ibid.*, p. 477.

44. IGERSHEIMER. **Spindle-celled sarcoma of the upper lid.** *Ibid.*, p. 477.

45. KOEPPE. **A case of involvement of the optic nerve and unilateral exophthalmos in exophthalmic goiter.** *Ibid.*, p. 477.

46. KUHNT, H. **Mucocele of the frontal sinus and of the ethmoid with a sudden exophthalmos of high degree.** *Zeitschr. f. Augenh.*, 1915, p. 64.

In KOEPPE'S (45, **Involvement of the optic nerve and unilateral exophthalmos in exophthalmic goiter**) case the exophthalmos was unilateral at first, but later became bilateral. The temporal pallor of the papilla in the other eye spoke against a diagnosis of retrobulbar tumor. Both visual fields were normal, the Wassermann negative. The diagnosis of exophthalmic goiter was confirmed by both internists and neurologists. Later there appeared in the right field a paracentral, semicircular relative scotoma that showed an injury of the optic nerve. Such an injury may be produced by other causes, as in persons who have been treated with thyroidin for obesity.

IGERSHEIMER (42, **Inflammation of the orbit**) showed a case of injury of the orbit in a soldier who had been shot through the lower lid by a Russian bullet. The bullet together with a quantity of dirty gray fluid that enclosed it was easily removed by Kroenlein's operation.

IGERSHEIMER (44, **Spindle-celled sarcoma of the upper lid**) showed also a spindle-celled sarcoma of the upper lid of a five-years-old boy which developed in the temporal part of the orbit and pushed the globe inward and forward. Two distinct lobes in the region of the lacrimal gland simulated at first a tumor of this gland. It was removed by Kroenlein's operation.

In KUHNT'S (46, **Mucocele of the frontal sinus**) case a traumatic mucocele developed in the frontal sinus that gradually involved the anterior and middle ethmoid cells. The pressure wore away the margins of a fissure made by the injury, through which the mucous membrane protruded, where it finally ruptured and allowed a quantity of the contents of the mucocele to enter between the periosteum and the bone. This resulted in a sudden exophthalmos of high degree. The lids could not close, the cornea became infiltrated and broke down. The mucocele was then operated on.

HOROWITZ (41, **Osteoma of the frontal sinus**) in his dissertation reviews the literature on this subject extensively. He divides the syndrome into two kinds of symptoms, the ocular and the cerebral. The functional disturbance of the eyes is of the most importance, as in many cases it is the only pathological symptom to call attention to an osteoma of the frontal sinus, and is usually an early symptom. The visual disturbance is chiefly the consequence of the displacement of the eyeball. The ocular symptoms sometimes are exophthalmos, though this is rather rare in the early stage, sometimes in disturbances of the functions of the extrinsic muscles, usually causing diplopia. A ptosis is the first symptom in many cases. An optic neuritis is added very often, or rather a choked disk, caused by the increased intraorbital pressure. The cerebral symptoms, headache, vomiting, dizziness, weakness of memory, are less constant and characteristic. In the case reported by the writer he seems to think that these cerebral symptoms were particularly well marked, but otherwise the description hardly differs from the ordinary. The tumor was removed successfully.

The 59-years-old patient of IGERSHEIMER (43, **Temporal optic atrophy in ethmoiditis**) had noticed for several years a feeling of pressure in his right eye and for a year an impairment of his vision. The visual field was contracted greatly below, vision was $\frac{5}{25}$, the papilla had a temporal pallor. Polyps were found in the nose and in the posterior ethmoidal cells. Probably there was erosion of the bony wall and pressure upon the optic nerve. No central scotoma was present. Operation was followed by a quick improvement and the vision rose to $\frac{5}{8}$.

XII.—CONJUNCTIVA.

47. AXENFELD, TH. **Is there an immunity to trachoma?** *Klin. Monatsbl. f. Augenheilkunde*, February–March, 1915, p. 121.
48. ELSCHNIG. **Hemorrhage into the lymphatics of the bulbar conjunctiva.** *Zentralbl. f. prakt. Augenheilkunde*, January, 1915, p. 8.
49. DE HAAS, H. K. **Granuloma conjunctivæ caused by a foreign body.** *Nederl. Tijdschr. voor Geneesk*, 1914, ii., No. 16.
50. RANDOLPH, R. L. **Melanosis of the conjunctiva. Report of a case.** *Ophthalmic Record*, January, 1915.
51. SCHENDEROWITSCH, P., and SIEGRIST, A. **Treatment of gonorrheal ophthalmia of infants and adults at the University eye clinic at Berne.** *Therapeutische Monatschrift*, January, 1915, p. 35.
52. WOLFF, L. K. **A new remedy for the treatment of diplobacillus conjunctivitis.** *Nederl. Tijdschr. voor Geneesk*, 1914, ii., No. 7.

ELSCHNIG (48, **Hemorrhage into the lymphatics of the bulbar conjunctiva**) has seen several cases in which a subconjunctival hemorrhage was accompanied by one into the lymphatics. Over the immovable, smoothly red subconjunctival effusion the conjunctiva is slightly swollen, easily movable, and one sees in it varicose blood-red tubes, about 1*mm* in diameter in front of the spot of blood. These little formations are seen particularly well with the corneal microscope. They coincide exactly in arrangement and extent with the lymphectasiæ of the bulbar conjunctiva, except that they contain fluid blood. They always disappear in three days at the most. A direct connection between them and the ecchymosis has not been observed.

WOLFF (52, **Treatment of diplobacillus conjunctivitis**) has treated successfully obstinate cases of diplobacillus conjunctivitis with a combination of fluorescin and zinc, which forms an orange powder that is thoroughly triturated and dusted into the conjunctival sac in small quantities. A concentrated solution in the tears is maintained for hours because of the slight solubility of the remedy, which shows the strong power of diffusion shown by all soluble combinations of fluorescin. This persistent action gives it an advantage over the solutions of zinc ordinarily employed. The tears are stained green for a day. VISSER.

The treatment of gonorrheal ophthalmia as described by SCHENDEROWITSCH and SIEGRIST (51, **Treatment of gonorrheal ophthalmia of infants and adults**) consists in cleansing the conjunctival sac with a two per cent. solution of boric acid and then instilling a three per cent. solution of collargol. This is done every hour at first, later only every two or three hours. Hot compresses of boric acid are applied for half an hour a half hour after each instillation. Syrgol has been used in the same way in a five per cent. solution. In 37 infants both eyes recovered without the least damage to the cornea. Treatment continued for from four to fifty-two days. In eight infants with corneal complications, three showed small maculæ on one eye, in three no corneal opacity was left, in one a little clear dimple was left in the cornea, and a leucoma adherens was caused in one. Of three adults with corneal complications, the eyes of one recovered without permanent harm, small leucomata adherentia were formed in both eyes of the second, and exenteration had to be performed in the third. Syrgol gave similar results. It is hard to say whether either remedy is any better than the other. The drawback of collargol is that it stains the exudate and the dressings black;

that of syrgol is that in infants it sometimes excites a diarrhea and a bad general condition.

Axenfeld (47, **Immunity to trachoma**) thinks that it is to be assumed that some men are less sensitive than others to trachoma, but this does not indicate the existence of an absolute immunity to the disease inasmuch as a special degree of virulence and a special way of transmission may always be imagined that could overcome the insusceptibility. The question in how far trachoma produces a local immunity must remain open for the present.

De Haas (49, **Granuloma conjunctivæ caused by a foreign body**) reports a case in which conjunctival granuloma grew rapidly after the removal of a benign cyst. A bit of the lint used for the dressing was found in the cells. The patient was myopic and the eye could not be closed completely on account of the protrusion. Visser.

Randolph (50, **Melanosis of the conjunctiva**) observed three small dark patches in the right lower conjunctival sac. The caruncle was deeply pigmented. In the left eye also there was a small pigmented area. No specimen could be obtained, but the condition was apparently congenital.

Alling.

XIII.—CORNEA AND SCLERA.

53. Axenfeld, Th. **Keratitis punctata leprosa and hæmatogenous localization of the bacilli in the cornea.** *Klin. Monatsbl. f. Augenh.*, Feb.–March, p. 201.

54. Fuchs, E. **Nodular opacity of the cornea.** *Arch. f. Ophth.*, lxxxix., p. 337.

55. Fuchs, E. **Senile marginal atrophy of the cornea.** *Ibid.*, p. 386.

56. Ohm, J. **The curative effect of scarlet red ointment in certain trachomatous ulcers of the cornea.** *Zeitschr. f. Augenh.*, 1915, p. 57.

57. Reitsch. **Staining of the superficially diseased cornea with fluorescin and Biebrich's scarlet red.** *Arch. f. Ophthalm.*, lxxxix., p. 299.

58. Ruemmler, K. **Keratitis aspergillina.** *Diss.*, Leipsic, 1914.

59. Smyth. **A case of extensive pigmentation of the sclera progressive (?).** *Transactions Ophthalmological Society of the United Kingdom*, 1914, p. 142.

60. Verhoeff, F. H. **Scleral puncture for expulsive subchoroidal hemorrhage following sclerostomy. Scleral puncture for postoperative separation of the choroid.** *Ophthalmic Record*, February, 1915.

The staining of the superficially diseased cornea with fluorescin depends, according to Groenouw and Fromm and the researches of REITSCH (57, **Staining of the cornea with fluorescin and scarlet red**), on diffusion into the corneal tissue, in the diseased epithelium and endothelium, and probably the stain affects only the cement substance and the lymph spaces in the propria. But one may be deceived easily as to the real size of the defect through the ready diffusibility. Where one obtains a stain with fluorescin the epithelial covering must be pierced, or there must be a certain loosening of the epithelium in superficial excoriations, and very minute superficial diseases of the eye may escape. In these cases scarlet red is better. Scarlet red is fitted for examination with artificial light and the corneal microscope. It is a direct tissue stain and does not diffuse. Excoriations by phlyctenular infiltrates are stained an intense red; superficial keratitides are as beautifully stained as herpes. This stain is particularly valuable in the most superficial diseases of the cornea, which one often suspects, but cannot see even with a great enlargement. The most minute punctate foci of disease or epithelial changes may be detected by its means. While it stains other ulcers well the author has seen no pneumococcus ulcer whose progressive margin had been stained even moderately well, so scarlet red may perhaps have some value in differential diagnosis. On the other hand quite fresh injuries do not take the red stain well until after the lapse of forty-eight hours; fresh erosions contain too small a number of nucleated cells. He has also used a double stain, first fluorescin, then scarlet red, which does particularly well in herpes corneæ. Scarlet red is not to be considered a sterile fluid, but the growth of bacteria may be checked by the addition of a very small quantity of a solution of oxycyanate of mercury.

OHM (56, **Curative effect of scarlet red in certain trachomatous ulcers**) has had good results in trachomatous ulcers of the cornea from an ointment containing scarlet red 0.5, olei olivæ q. s. for the most minute subdivision, vaselin ad 10.0, in connection with an atropine-cocaine ointment.

Five days before his admission to the clinic RUEMMLER'S (58, **Keratit s aspergillina**) patient, 49 years old, had his right eye injured by a straw. On admission there was a purulent corneal ulcer, the active agent of which was found to be the aspergillus. The ulcer was in the central lower part of the cornea, had a yellowish gray base and thick margins. It was surrounded by a less marked ring of infiltration, with an interval between the two that was almost free from infiltration. The aqueous was cloudy and at the bottom of the anterior chamber lay a hypopyon 2*mm* high. Perforation took place, followed by healing with an anterior synechia and agglutination of the margin of the pupil. Cultures and inoculations showed the agent to be the aspergillus fumigatus. There is no specific remedy for keratitis aspergillina known at the present time.

AXENFELD (53, **Keratitis punctata leprosa**) found an orange yellow, gelatinous thickening in the episclera about the cornea, in which there were numerous minute gray specks beneath the smooth epithelium that had no connection whatever with the margin. Corresponding to these, completely isolated in a non-vascular area, he saw microscopic nests of leprosy bacilli just beneath Bowman's membrane. This establishes the fact of isolated, hæmatogenous, metastatic foci of motionless bacilli in the cornea.

FUCHS (54, **Nodular opacity of the cornea**) describes the microscopical findings in two cases. There are two primary changes chiefly, namely the excretion of an often lamellated substance immediately beneath the epithelium that stains red with Giemsa's stain, and a granular substance in the cornea itself that stains blue. A characteristic point is that, aside from the larger gray nodules, the rest of the cornea was covered by dense, very minute, dustlike specks. He thinks it probable that the true nature of the disease in the granular excretion consists of a basophilic substance, and that the deposit of a second acidophilic substance upon Bowman's membrane occurs as something secondary. The changes of the epithelium, the thinning and destruction of Bowman's membrane, as well as the loosening up and destruction in places of the corneal lamellæ are always accessory. The disease appears to be a nutritive disturbance, or dystrophy, characterized by the excretion of substances that are insoluble in the tissue juices. He is inclined to ascribe it to an alteration of the internal secretions.

FUCHS (55, **Senile marginal atrophy of the cornea**) describes a microscopical preparation that showed changes which make it very probable that it presented the beginning of a senile marginal atrophy of the cornea. The surface of the cornea was sunken at the arcus senilis. The change at the upper margin was more marked than at the lower. The tissue was unravelled with a steep, sharp central, and a sloping, indistinct peripheral margin. The change begins with the splitting of Bowman's membrane, at or near its margin. Then the corneal lamellæ lying immediately beneath change so that the deeper-lying cement joining the fibrils dissolves. Another change takes place in the breaking down of the corneal substance. The dissolution of the cement between the fibrils and the loosening of some of them must be regarded as the result of an altered chemical condition and as a process of degeneration, as signs of inflammation were absent. The nuclei of the fixed corneal corpuscles were increased. The change increases continually in depth, but not in breadth; the lamellæ formed by splitting become thin and have an appearance more like connective tissue, some lamellæ at the central margin of the groove are entirely destroyed; finally the base of the groove becomes ectatic, Descemet's membrane protrudes and ruptures or is covered by a deposit.

SMYTH (59, **Extensive pigmentation of the sclera**) reports a case of twelve years' progression in one eye, the lower and inner quadrant being most affected, the upper quadrant being free from change.

CURRAN.

VERHOEFF (60, **Scleral puncture for hemorrhage after sclerostomy**) performed a sclerostomy combined with a large buttonhole iridectomy in an eye with glaucoma simplex in which the tension was 72*mm.* No difficulties were encountered until the end of the operation when the vitreous appeared and continued to pour out rapidly. About one half of the vitreous was extruded before the flow suddenly ceased. Four hours later he made three scleral punctures which allowed the escape of considerable blood but the eye immediately filled again. There was some pain and some hemorrhage during the day following but the eye recovered with normal tension and vision $\frac{20}{200}$. He suggests the possibility of help from this procedure in expulsive hemorrhage after operation. Verhoeff also reports a case of supposed choroidal separation, three weeks after cataract operation, in which he did scleral puncture and obtained a considerable quantity of clear fluid. The eye, which had been soft, inflamed, and, with no anterior chamber, returned to normal. ALLING.

XIV.—IRIS AND PUPILS.

61. HILBERT. **A case of hippus.** *Zentralbl. f. prakt. Augenh.*, Feb., p. 38.

62. METZNER and WOELFFLIN. **Clinical and experimental studies of paralysis of the cervical sympathetic.** *Arch. f. Ophth.*, lxxxix., 2, p. 308.

63. REBER, W., and LAWRENCE, G. **Gonorrheal iritis as a manifestation of an old latent gonococcæmia.** *Ophthalmic Record*, January, 1915.

64. STEINER. **Iris with congenital melanosis.** *Klin. Monatsbl. f. Augenheilkunde*, February–March, 1915, p. 193.

METZNER and WOELFFLIN (62, **Paralysis of the cervical sympathetic**) have studied this subject clinically and experimentally. Woelfflin deals with the clinical part. He divides the symptoms into three groups, the oculo-pupillary, the vascular, and the trophic. Only three of the ocular disturbances were formerly known, the so-called Horner's triad, myosis, narrowed palpebral fissure, and enophthalmos. The pupillary difference is less in adaptation to light than to dark, a point that may be of diagnostic importance. While the size of the pupil remains almost constant the width of the palpebral fissure may undergo fluctuations of several millimeters. Enophthalmos is less common. Hypotony is to be observed in paralysis of the sympathetic, as was proved experimentally, but it is transient. Sometimes lacrimation occurs, the reason of which is not quite clear; perhaps the lacrimal gland has a double innervation from the sympathetic and facial. The vessels of the eye are dilated the same as those of other regions affected. A flattening of the cornea occurs, which may amount according to some writers to 1¼ to 1½ D, although Hertel could demonstrate nothing of the sort. The discoloration of the iris is plainly a sign of trophic disturbances, which show themselves mainly in emaciation of the side of the face, but may extend to troubles in the bones. The vascular disturbances express themselves, often transiently, in marked dilatations of the vessels on the affected side, which undergo fluctuations. Perspiration is sometimes increased, sometimes diminished, usually the latter.

HILBERT (61, **Hippus**) observed a case of iridocyclitis of one eye and a hippus of the other without other disturbances. After the iridocyclitis got well the hippus disappeared.

STEINER (64, **Iris with congenital melanosis**) observed in a Japanese woman a melanosis of the iris, which is very rare in that race. The entire surface of the iris formed a uniform plane disfigured by flat, wartlike elevations. No traces of the usual details of the iris could be seen. The color was a dark black brown. There were no signs of a former inflammation.

REBER and LAWRENCE (63, **Gonorrheal iritis as a manifestation of an old latent gonococcæmia**) report three cases in which the gonorrheal infection was latent, and in one case was of fifteen years' standing. The complement-fixation test was positive. In all there was rapid improvement and almost immediate cessation of pain after injection of stock Neisser serobacterin (mixed). Iritis is probably caused by latent gonococcæmia more often than is supposed, and the complement-fixation test, as well as the Wassermann, should be made in all cases.

ALLING.

XV.—LENS.

65. AXENFELD. **Blepharotomia externa during cataract extraction.** *Klin. Monatsbl. f. Augenheilkunde*, January, 1915, p. 97.

66. CLARK, C. F. **Congenital cataract.** *Ophthalmic Record*, March, 1915.

67. CRIDLAND. **A case of glassblower's cataract in a " puddler " (ironworker).** *Ophthalmoscope*, March, 1915.

68. ELSCHNIG. **Intraocular reposition.** *Klin. Monatsbl. f. Augenheilkunde*, February–March, 1915, p. 186.

69. FERGUS, FREELAND. **Essential points in cataract operations.** *Ophthalmic Review*, September, 1914.

70. LANCASTER and WILLIAMS. **The effect of accommodation on the viscosity of the lens.** *Ophthalmoscope*, March, 1915.

71. SAUPE. **The results of operations on juvenile cataract.** *Inaug. Diss.*, Jena.

72. ZIMMERMAN, C. **Annular opacity of the anterior surface of the lens after traumatism.** *Ophthalmology*, January, 1915.

LANCASTER and WILLIAMS (70, **The effect of accommodation on the viscosity of the lens**) give an account of some interesting experiments which go to prove that viscosity of the lens is a considerable factor in the process of accommodation. In such an excellent paper as this, it is to be regretted that the authors do not state the ages of the subjects experimented on. A series of such experiments on persons of different ages would be of great value.

CURRAN.

ZIMMERMAN (72, **Annular opacity of the anterior surface of the lens after traumatism**) noted the typical Vossius ring of faint opacity on the anterior surface of the lens, about the size of the medium-dilated pupil, after an injury to the eye by a rifle loaded with dirt. It disappeared in about three weeks. It was not visible by oblique illumination but with a strong convex lens in the ophthalmoscope. He does not think that the condition is produced by indentation of the cornea but by increased pressure in the anterior chamber forcing the iris against the lens.

ALLING.

CRIDLAND (67, **A case of glassblower's cataract in a "puddler"—iron worker**) reports a case of cataract in a worker in iron which had the posterior polar opacities similar to the glassblower's cataract. He had seen five similar cases in ten years, and since the cataract can be found in other occupations than glassblowers' who have to gaze at bright hot lights, he suggests the term "ray cataract."

CURRAN.

FREELAND FERGUS (69, **Essential points in cataract operations**) says if an operation is absolutely aseptic, there will not be any iritis. He does not think that the inclusion of the capsule or lens substance or shreds of iris cause postoperative inflammation; nor does he consider articles of lens substance in the eyeball conducive to inflammation. He holds that all such postoperative inflammations are due to infection, and that if the eye is kept absolutely aseptic there is no chance of a tough capsule and if there is any secondary cataract it will be of the flimsiest kind.

CURRAN.

CLARK (66, **Congenital cataract**) is a strong advocate ot free discission of cataract, in young people, followed at the right time, usually a few days, by linear extraction. As one can always remove the swollen lens matter if glaucoma ensues, it is difficult to see why it is not safer to allow it to absorb by the usual method.

ALLING.

SAUPE (71, **Results of operations on juvenile cataracts**) gives the results of twenty-seven operations on nineteen patients. General anæsthesia was used with the smaller children. He prefers primary linear extraction as only one operation is needed as a rule and the secondary cataract is slight. Iridectomy is avoided when possible. The results of primary linear extraction are better than after a preliminary discission, as this sometimes misses its aim and necessitates a longer treatment.

AXENFELD (65, **Blepharotomia externa during cataract extraction**) makes a simple canthotomy when the palpebral fissure is too small, especially when the lids are tense, and sometimes when the patient squeezes. An anæsthetic is injected and a snip is made with scissors at the outer canthus without causing pain or bleeding. The wound heals readily with no sutures. (This operation has never been thought worthy of the dignity of being so designated in this country, but has been performed whenever indicated for a great many years.—F.)

It occasionally happens after a linear extraction of cataract that a bit of the iris becomes engaged in the incision, causing a distortion of the pupil and a lowering of the vision. To obviate this ELSCHNIG (68, **Intraocular reposition**) introduces a Knapp's knife needle into the anterior chamber at the margin of the cornea and disengages the iris from the cornea with its point. The pupil then becomes round. It may be possible to detach the iris at its root if its tissue is rigid.

(*To be continued.*)

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